

**Department of Electrical & Electronics Engineering**  
**Curriculum under Academic Regulation 2016 of JNTUK Kakinada**

**Course Title: English-1**

**Course Code: R161101**

CO No	CO STATEMENT	PO's
		PO12
C101.1	The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.	3
C101.2	The lesson motivates the public to adopt road safety measures.	3
C101.3	The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.	3
C101.4	The lesson helps to choose a source of energy suitable for rural India.	3
C101.5	The lesson creates an awareness in the reader as to the usefulness of animals for human society.	3
C101.6	The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.	3

**Course Title: Mathematics I**

**Course Code: R161102**

CO No	CO STATEMENT	PO's	
		PO1	PO12
C102.1	Solve linear differential equations of first order and first degree.	3	1
C102.2	Solve linear differential equations of second and higher order.	3	1
C102.3	Determine Laplace transform and inverse Laplace transform of various functions	3	1
C102.4	Use Laplace transforms to determine general solutions to linear ODE.	3	1
C102.5	Calculate total derivative, Jacobian and minima of functions of two variables.	3	1
C102.6	Solve partial differential equations of first, second and higher order.	3	1

**Course Title: Applied Chemistry**

**Course Code: R166106**

CO No	CO STATEMENT	PO's
		PO1
C103.1	The advantages and limitations of plastic materials and their use in design would be understood	3
C103.2	Fuels which are used commonly and their economics, advantages and limitations are discussed.	3
C103.3	Reasons for corrosion and some methods of corrosion control would be understood.	3
C103.4	The students would be now aware of materials like nano-materials and fullerenes and their uses	3
C103.5	Similarly liquid crystals and superconductors are understood	3
C103.6	The importance of green synthesis is well understood and how they are different from conventional methods is also explained.	3

**Course Title: Engineering Mechanics**

**Course Code: R161111**

CO	CO Statement	PO's
		PO1
C104.1	Draw free body diagrams for particles and rigid bodies in plane and space and problems to solve the unknown forces, orientations and geometric parameters	3
C104.2	Explain the concepts of trusses and friction, direction and its application	3
C104.3	Identify the centroid, Centre of Gravity of composite figures and bodies	3
C104.4	Determine area and mass movement of inertia for composite sections	3
C104.5	Apply the fundamental concepts of Kinematics and kinetics of particles to the analysis of simple, practical problems	3
C104.6	Find the motion of particles and rigid bodies and apply the principles of motion, work energy and impulse – momentum	3

**Course Title: Computer Programming**

**Course Code: R161107**

CO	CO Statement	PO's
		PO1
C105.1	Understand the basic terminology used in computer programming	3
C105.2	Write, compile and debug programs in C language.	3
C105.3	Use different data types in a computer program.	3
C105.4	Design programs involving decision structures, loops and functions.	3
C105.5	Explain the difference between call by value and call by reference	3
C105.6	Understand the dynamics of memory by the use of pointers	3
C105.7	Use different data structures and create/update basic data files	3

**Course Title: Environment Studies**

**Course Code: R161108**

CO	CO Statement	PO's
		PO1
C106.1	The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources	3
C106.2	The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web	3
C106.3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity	3
C106.4	Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices	3
C106.5	Social issues both rural and urban environment and the possible means to combat the challenges	3
C106.6	The environmental legislations of India and the first global initiatives towards sustainable development.	3

**Course Title: Applied Chemistry Lab**

**Course Code: R161122**

CO No	CO Statement	PO's	
		PO1	PO4
C107.1	Estimate of Vitamin-C	3	3
C107.2	Determine the cell constant and conductance of solutions	3	3
C107.3	To Prepare advanced polymer materials	3	3
C107.4	Calculate the hardness of water	3	3
C107.5	Determine the functioning of the pH instruments	3	3
C107.6	Determine the functioning of the Potentiometric meters	3	3

**Course Title: English Communication Skills Laboratory-I**

**Course Code: R161114**

CO No	CO Statement	PO's
		PO 10
C108.1	Developed better understanding nuances of English Language through audio – visual experience and group activities.	3
C108.2	Learnt to use neutralization of accent for intelligibility.	3
C108.3	Improved communicative competence that includes clarity and confidence which in turn enhances their employability skills.	3
C108.4	Able to communicate in formal and informal situations.	3
C108.5	To Cultivate communicative Competence.	3
C108.6	To make them ready for Industry.	3

**Course Title: Computer Programming Laboratory**

**Course Code: R161119**

CO No	CO Statement	PO's	
		PO1	PO4
C109.1	Apply and practice logical ability to solve the problems.	2	3
C109.2	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment	2	3
C109.3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs	2	3
C109.4	Understand and apply the in-built functions and customized functions for solving the problems.	2	3
C109.5	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.	2	3
C109.6	Document and present the algorithms, flowcharts and programs in form of user-manuals	2	3
C109.7	Identification of various computer components, Installation of software	2	3

**Course Title: English II**

**Course Code: R161210**

CO No	CO Statement	PO's
		PO 10
C110.1	Developed better understanding nuances of English Language through audio – visual experience and group activities.	3
C110.2	Learnt to use neutralization of accent for intelligibility.	3

C110.3	Improved communicative competence that includes clarity and confidence which in turn enhances their employability skills.	3
C110.4	Able to communicate in formal and informal situations	3
C110.5	To Cultivate communicative Competence	3
C110.6	To make them ready for Industry	3

**Course Title: Mathematics II**

**Course Code: R161202**

CO No	CO Statement	PO's
		PO1
C111.1	Calculate a root of algebraic and transcendental equations.	3
C111.2	Explain relation between the finite difference operators.	3
C111.3	Compute interpolating polynomial for the given data.	3
C111.4	Solve ordinary differential equations numerically using Euler's and RK method.	3
C111.5	Find Fourier series and Fourier transforms for certain functions.	3
C111.6	Identify/classify and solve the different types of partial differential equations.	3

**Course Title: Mathematics III**

**Course Code: R161203**

CO No	CO Statement	PO's
		PO1
C112.1	Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.	3
C112.2	Solve simultaneous linear equations numerically using various matrix methods.	3
C112.3	Determine double integral over a region and triple integral over a volume.	3
C112.4	Calculate gradient of a scalar function, divergence and curl of a vector function.	3
C112.5	Determine line, surface and volume integrals.	3
C112.6	Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals	3

**Course Title: Applied Physics**

**Course Code: R161207**

CO No	CO Statements	PO's
		PO1
C113.1	Illustrate the experimental evidence of wave nature of light and interference in thin films, Diffraction grating and Polarization	3
C113.2	Classify various types of lasers & optical fibers	3
C113.3	Explain the concepts and applications of magnetic and dielectric materials	3
C113.4	Interpret the microscopic behaviour of Matter with quantum mechanics and explain the various electron theories	3
C113.5	Summarise various types of solids based on band theory	3
C113.6	identify the type of semiconductor using Hall effect	3

**Course Title: Electric Circuit Analysis I**

**Course Code: R161208**

CO No	CO Statement	PO's			
		PO1	PO3	PO10	PSO1
C114.1	Various electrical networks in presence of active and passive elements.	3	3	2	1
C114.2	Electrical networks with network topology concepts.	3	3	2	1

C114.3	Any magnetic circuit with various dot conventions.	3	3	2	1
C114.4	Any R, L, C network with sinusoidal excitation.	3	3	2	1
C114.5	Any R, L, network with variation of any one of the parameters i.e R, L, C. and f.	3	3	2	1
C114.6	Electrical networks by using principles of network theorems.	3	3	2	1

**Course Title: Engineering Drawing**

**Course Code: R161210**

CO No	CO Statements	PO's		
		PO1	PO5	PO10
C115.1	To introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.	3	2	3
C115.2	To introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.	3	2	3
C115.3	To make the students draw the projections of the lines inclined to both the planes	3	2	3
C115.4	To make the students draw the projections of the plane inclined to both the planes.	3	2	3
C115.5	To make the students draw the projections of the various types of solids in different positions inclined to one of the planes	3	2	3
C115.6	To represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.	3	2	3

**Course Title: English Communication Skills Laboratory-II**

**Course Code: R161221**

CO No	CO Statements	PO's
		PO 10
C116.1	Developed better understanding nuances of English Language through audio – visual experience and group activities.	3
C116.2	Learnt to use neutralization of accent for intelligibility	3
C116.3	Improved communicative competence that includes clarity and confidence which in turn enhances their employability skills.	3
C116.4	Able to communicate in formal and informal situations	3
C116.5	To Cultivate communicative Competence	3
C116.6	To make them ready for Industry	3

**Course Title: Applied Physics Lab**

**Course Code: R161225**

CO No	CO Statements	PO's	
		PO1	PO4
C117.1	Relate the principle of physics in engineering field and compare the results with theoretical calculations	3	2
C117.2	Understand modern engineering physics techniques and	3	2
C117.3	Understand tools in real time applications in engineering studies	3	2
C117.4	Distinguish the characteristics of materials in a practical manner and gain knowledge of its usage	3	2
C117.5	Develop the laboratory skills in handling of electrical and optical instruments	3	2

C117.6	Demonstrate the interference and diffraction phenomena of light	3	2
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**Course Title: Engineering Workshop & IT Workshop**

**Course Code: R161224**

CO No	CO Statements	PO's	
		PO1	PO4
C118.1	Identify different tools used in various trades of engineering workshop	3	2
C118.2	Fabricate different joints in carpentry	3	2
C118.3	Develop various types of fits in fitting trade	3	2
C118.4	Form simple parts in blacksmithy	3	2
C118.5	Fabricate simple objects in tin smithy .	3	2
C118.6	Employ the principle of electrical wiring for simple applications like series and parallel wiring.	3	2

**Course Title: Electric Circuit Analysis II**

**Course Code: R1621021**

CO No	CO Statement	PO's			
		PO1	PO3	PO10	PSO1
C201.1	Examine 3-Phase circuits under Balanced loads.	3	3	2	1
C201.2	Examine 3-Phase circuits with Un-Balanced loads.	3	3	2	1
C201.3	Estimate the Transient behaviour of electrical circuits using different approaches.	3	3	2	1
C201.4	Solve Two Port Networks and obtain different parameters for a given Two port Network.	3	3	2	1
C201.5	Obtain electrical equivalent network for a given Transfer Function.	3	3	2	1
C201.6	Extract different harmonics components from the response of an electrical network.	3	3	2	1

**Course Title: Electrical Machines I**

**Course Code: R1621022**

CO No	CO Statements	PO's		
		PO2	PO3	PSO1
C202.1	Able to assimilate the concepts of electromechanical energy conversion.	2	3	1
C202.2	Able to mitigate the ill-effects of armature reaction and improve commutation in dc machines.	2	3	1
C202.3	Able to understand the torque production mechanism and control the speed of dc motors.	2	3	1
C202.4	Able to analyze the performance of single phase transformers.	2	3	1
C202.5	Able to predetermine regulation, losses and efficiency of single phase transformers.	2	3	1
C202.6	Able to parallel transformers, control voltages with tap changing methods and achieve three-phase to two-phase transformation.	2	3	1

**Course Title: Basic Electronic Devices**

**Course Code: R1621023**

CO No	CO Statements	PO's		
		PO1	PO3	PO10
C203.1	Students are able to understand the basic concepts of semiconductor physics, which are useful to understand the operation of diodes and transistors.	3	2	2
C203.2	Students are able to explain the operation and characteristics of PN junction diodes and special diodes.	3	2	2
C203.3	Ability to understand operation and design aspects of rectifiers and regulators.	3	2	2
C203.4	Students are able to understand the characteristics of various transistor configurations. They become familiar with different biasing, stabilization and compensation techniques used in transistor circuits.	3	2	2
C203.5	Students are able to understand the operation and characteristics of FET, Thyristors, Power IGBTs and Power MOSFETs.	3	2	2
C203.6	Students are able to understand the merits and demerits of positive and negative feedback and the role of feedback in oscillators and amplifiers.	3	2	2

**Course Title: Electro Magnetic Fields**

**Course Code: R1621024**

CO No	CO Statement	PO's
		PO1
C204.1	To Determine electric fields and potentials using gauss's law for solving Laplace's or Poisson's equations, for various electric charge distributions.	3
C204.2	To Calculate and design capacitance, energy stored in dielectrics.	3
C204.3	To Calculate the magnetic field intensity due to current, the application of ampere's law and the Maxwell's second and third equations	3
C204.4	To determine the magnetic forces and torque produced by currents in magnetic field	3
C204.5	To determine self and mutual inductances and the energy stored in the magnetic field.	3
C204.6	To calculate induced e.m.f., understand the concepts of displacement current and Poynting vector.	3

**Course Title: Thermal and Hydro Prime Movers**

**Course Code: R1621025**

CO No	CO Statements	PO's		
		PO2	PO3	PSO1
C205.1	To make the student learn about the constructional features, operational details of various types of internal combustion engines through the details of several engine systems and the basic air standard cycles that govern the engines. Further, the student shall be able to calculate the performance of different types of internal combustion engines.	3	2	2
C205.2	To train the student in the aspects of steam formation and its utilities through the standard steam data tables and charts. To make the student correlate between the air standard cycles and the actual cycles that govern the steam turbines. To train the student to calculate the performance of steam turbines using velocity diagrams.	3	2	2
C205.3	To impart the knowledge of gas turbine fundamentals, the governing cycles and the methods to improve the efficiency of gas turbines.	3	2	2

C205.4	To teach the student about the fundamentals of fluid dynamic equations and its applications are fluid jets. To impart the knowledge of various types of pumps, their constructional features, working and performance.	3	2	2
C205.5	To make the student learn about the constructional features, operational details of various types of hydraulic turbines. Further, the student shall be able to calculate the performance of hydraulic turbines.	3	2	2
C205.6	To train the student in the areas of types of hydroelectric power plants, estimation and calculation of different loads by considering various factors.	3	2	2

**Course Title: Managerial Economics and Financial Analysis**

**Course Code: R1621026**

CO No	CO Statements	PO's
		PO 11
C206.1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product.	3
C206.2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.	3
C206.3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.	3
C202.4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.	3
C202.5	The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.	3
C202.6	Able to learn Meaning of Capital-Capitalization Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability	3

**Course Title: THPM LAB**

**Course Code: R1621027**

CO No	CO Statement	PO's	
		PO4	PSO1
C207.1	To impart practical knowledge on the performance evaluation methods of various internal combustion engines, flow measuring equipment and hydraulic turbines and pumps.	3	1
C207.2	Able to learn the aspects of steam formation and its utilities through the standard steam data tables and charts and also to correlate between the air standard cycles and the actual cycles that govern the steam turbines.	3	1
C207.3	Able to gain knowledge of gas turbine fundamentals, the governing cycles and the methods to improve the efficiency of gas turbines.	3	1
C207.4	Able to learn fundamental of fluid dynamic equations and its applications fluid jets	3	1
C207.5	Able to operate various types of hydraulic turbines and calculate its performance	3	1
C207.6	Able to identify types of hydroelectric power plants estimation and calculation of different loads by considering various factors.	3	1



**Course Title: Electric Circuit Analysis Lab**

**Course Code: R1621028**

CO No	CO Statement	PO's	
		PO4	PSO1
C208.1	Apply various theorems for simplifying both AC and DC circuits.	3	1
C208.2	Assess the time response of series RL and RC circuits.	3	1
C208.3	Determine the coefficient of coupling for a given single-Phase transformer.	3	1
C208.4	Evaluate various two port network parameters of an electric circuit.	3	1
C208.5	Find choke coil parameters using various techniques	3	1
C208.6	Assess the Reactive and Active Power for the given star/delta connected loads.	3	1

**Course Title: Electrical Measurements**

**Course Code: R1632026**

CO No	CO Statement	PO's	
		PO2	PSO1
C209.1	Able to choose the right type of instrument for measurement of voltage and current for AC and DC.	3	1
C209.2	Able to choose the right type of instrument for measurement of power and energy – able to calibrate energy meter by suitable method.	3	1
C209.3	Able to calibrate ammeter and potentiometer.	3	1
C209.4	Able to select suitable bridges for measurement of electrical parameters.	3	1
C209.5	Able to use the ballistic galvanometer and flux meter for magnetic measuring instruments	3	1
C209.6	Able to measure frequency and phase difference between signals using CRO. Able to use digital instruments in electrical measurements.	3	1

**Course Title: Electrical Machines II**

**Course Code: R1622022**

CO No	CO Statements	PO's
		PO 4
C210.1	Able to explain the operation and performance of three phase induction motors.	3
C210.2	Able to analyze the torque-speed relation, performance of induction motor and induction generator.	3
C210.3	Able to explain design procedure for transformers and three phase induction motors.	3
C210.4	Implement the starting of single phase induction motors.	3
C210.5	To perform winding design and predetermine the regulation of synchronous generators.	3
C210.6	Avoid hunting phenomenon, implement methods of starting and correction of power factor with synchronous motor.	3

**Course Title: Switch Theory & Logic Design**

**Course Code: R1622023**

CO No	CO Statement	PO's	
		PO1	PO3
C211.1	able to review the types of number system and codes	3	2
C211.2	able to learn about minimizing techniques using various techniques	3	2
C211.3	able to design differential combinational logic circuits design	3	2
C211.4	able to learn and apply PLD	3	2
C211.5	able to learn sequential circuits, flipflops and excitation tables	3	2

C211.6	able to analyze sequential circuits, state diagrams, state tables along with its reduction techniques and design procedures	3	2
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**Course Title: CONTROL SYSTEMS**

**Course Code: R1622024**

CO No	CO Statement	PO's	
		PO3	PSO 1
C212.1	Ability to derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.	3	1
C212.2	Capability to determine time response specifications of second order systems and to determine error constants.	3	1
C212.3	Acquires the skill to analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method.	3	1
C212.4	Capable of analyzing the stability of LTI systems using frequency response methods.	3	1
C212.5	Able to design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.	3	1
C212.6	Ability to represent physical systems as state models and determine the response. Understanding the concepts of controllability and observability.	3	1

**Course Title: Power Systems I**

**Course Code: R1622025**

CO No	CO Statement	PO's			
		PO2	PO7	PO10	PSO1
C213.1	Students are able to identify the different components of thermal power plants.	3	1	2	1
C213.2	Students are able to identify the different components of nuclear Power plants.	3	1	2	1
C213.3	Students are able to distinguish between AC/DC distribution systems and also estimate voltage drops of distribution systems.	3	1	2	1
C213.4	Students are able to identify the different components of air and gas insulated substations.	3	1	2	1
C213.5	Students are able to identify single core and multi core cables with different insulating materials.	3	1	2	1
C213.6	Students are able to analyze the different economic factors of power generation and tariffs.	3	1	2	1

**Course Title: MANAGEMENT SCIENCE**

**Course Code: R1622026**

CO No	CO Statements	PO's		
		PO1	PO3	PSO1
C214.1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.	3	3	1
C214.2	Will familiarize with the concepts of functional management, project management and strategic management.	3	3	1
C214.3	Able to learn the concept of HRM, HRD and PMIR along with the marketing strategies	3	3	1
C214.4	Able to learn about PERT, CPM along with difference between them	3	3	1

C214.5	Able to gain knowledge on strategic management and its functions	3	3	1
C214.6	Able to learn the basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM)	3	3	1

**Course Title: Electrical Machines I Lab**

**Course Code: R1622027**

CO No	CO Statement	PO's	
		PO4	PSO1
C215.1	Determine the Characteristic of DC motor and generator	3	1
C215.2	Estimate various losses in DC machines and transformers	3	1
C215.3	Differentiate between various control methods for DC motors	3	1
C215.4	Identify and compute safe operating limits for machines	3	1
C215.5	To pre-determine the efficiency of the transformer.	3	1
C215.6	Obtain three phase to two phase transformation	3	1

**Course Title: EDC LAB**

**Course Code: R1622028**

CO No	CO Statement	PO's	
		PO4	PSO1
C216.1	Identify and demonstrate different semiconductor devices and measuring instruments.	3	1
C216.2	Experiment with the semiconductor devices and observe the characteristics.	3	1
C216.3	Design and analyse different types of rectifier circuits using PN Junction Diodes and interpret the results.	3	1
C216.4	Summarize the characteristics of BJT and FET.	3	1
C216.5	Design different amplifiers and evaluate their frequency response.	3	1
C216.6	Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter Function.	3	1

**Course Title: Power Systems II**

**Course Code: R1631021**

CO No	CO Statement	PO's			
		PO2	PO7	PO10	PSO1
C301.1	Able to understand parameters of various types of transmission lines during different operating conditions.	3	1	2	1
C301.2	Able to understand the performance of short and medium transmission lines.	3	1	2	1
C301.3	Study the performance and modeling of long transmission lines.	3	1	2	1
C301.4	Students will be able to understand travelling waves on transmission lines.	3	1	2	1
C301.5	Will be able to understand various factors related to charged transmission lines.	3	1	2	1
C301.6	Will be able to understand sag/tension of transmission lines and performance of line insulators.	3	1	2	1

**Course Title: Renewable Energy Sources**

**Course Code: R1631022**

CO No	CO Statements	PO's		
		PO1	PO3	PO5
C302.1	Analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface.	3	2	1
C302.2	Design solar thermal collectors, solar thermal plants.	3	2	1
C302.3	Design solar photovoltaic systems.	3	2	1
C302.4	Develop maximum power point techniques in solar PV and wind energy systems.	3	2	1
C302.5	Explain wind energy conversion systems, wind generators, power generation.	3	2	1
C302.6	Explain basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.	3	2	1

**Course Title: Signals and Systems**

**Course Code: R1631023**

CO No	CO Statements	PO's		
		PO2	PO3	PSO1
C303.1	Characterize the signals and systems and principles of vector spaces, Concept of orthogonality.	3	3	1
C303.2	Analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform.	3	3	1
C303.3	Apply a sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct them back.	3	3	1
C303.4	Understand the relationships among the various representations of LTI systems	3	3	1
C303.5	Understand the Concepts of convolution, correlation, Energy and Power density spectrum and their relationships.	3	3	1
C303.6	Apply z-transform to analyze discrete-time signals and systems.	3	3	1

**Course Title: Pulse and Digital Circuits**

**Course Code: R1631024**

CO No	CO Statement	PO's	
		PO1	PO3
C304.1	Design linear and non-linear wave shaping circuits.	3	2
C304.2	Design non-linear wave shaping circuits.	3	2
C304.3	Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.	3	2
C304.4	Design different multivibrators and time base generators.	3	2
C304.5	Design different time base generators.	3	2
C304.6	Utilize the non sinusoidal signals in many experimental research areas.	3	2

**Course Name: C305 Year of Study: 2019-20 PE**

**Course Title: Power Electronics**

**Course Code: R1631025**

CO No	CO Statements	PO's		
		PO2	PO3	PSO1
C305.1	Explain the characteristics of various power semiconductor devices and analyze the static and dynamic characteristics of SCR.	2	3	1
C305.2	Design firing circuits for SCR.	2	3	1

C305.3	Explain the operation of single phase full-wave converters and analyze harmonics in the input current.	2	3	1
C305.4	Explain the operation of three phase full-wave converters.	2	3	1
C305.5	Analyze the operation of different types of DC-DC converters.	2	3	1
C305.6	Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.	2	3	1
C305.7	Analyze the operation of AC-AC regulators.	2	3	1

**Course Title: EM II Lab**

**Course Code: R1631026**

CO No	CO Statements	PO's
		PO 4
C306.1	Able to assess the performance of single phase and three phase induction motors.	3
C306.2	Able to control the speed of a three phase induction motor.	3
C306.3	Able to predetermine the regulation of three-phase alternators by various methods.	3
C306.4	Able to find the $X_d/X_q$ Ratio of alternator and assess the performance of three-phase synchronous motors.	3
C306.5	Able to assess the performance of three phase induction motors.	3
C306.6	Able to find the performance of three-phase synchronous motors.	3

**Course Title: Control Systems Lab**

**Course Code: R1631027**

CO No	CO Statement	PO's	
		PO4	PSO1
C307.1	Able to analyze the performance and working Magnetic amplifier, D.C and A.C. servo motors and synchronous motors.	3	1
C307.2	Able to design P,PI,PD and PID controllers	3	1
C307.3	Able to design lag, lead and lag-lead compensators	3	1
C307.4	Able to control the temperature using PID controller	3	1
C307.5	Able to determine the transfer function of D.C.motor	3	1
C307.6	Able to control the position of D.C servo motor performance	3	1

**Course Title: Electrical Measurements Lab**

**Course Code: R1631028**

CO No	CO Statement	PO's	
		PO4	PSO1
C308.1	To be able to measure the electrical parameters voltage, current, power, energy and electrical characteristics of resistance, inductance and capacitance.	3	1
C308.2	To be able to test transformer oil for its effectiveness.	3	1
C308.3	To be able to measure the parameters of an inductive coil.	3	1
C308.4	To understand the calibration of DC and AC Potentiometers.	3	1
C308.5	To understand the testing of CT and PT.	3	1
C308.6	To understand the measurement of strain, Phase difference and frequency.	3	1

**Course Title: Power Electronic Controllers and Drives**

**Course Code: R1632021**

CO No	CO Statement	PO's		
		PO2	PO3	PSO1
C309.1	Explain the fundamentals of electric drive and different electric braking methods.	2	3	1
C309.2	Analyze the operation of three phase converter fed dc motors and four quadrant operations of dc motors using dual converters.	2	3	1
C309.3	Describe the converter control of dc motors in various quadrants of operation	2	3	1
C309.4	Know the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters	2	3	1
C309.5	Differentiate the stator side control and rotor side control of the three phase induction motor.	2	3	1
C309.6	Explain the speed control mechanism of synchronous motors	2	3	1

**Course Title: Power System Analysis**

**Course Code: R1632022**

CO No	CO Statement	PO's			
		PO2	PO3	PO6	PSO1
C310.1	Able to draw impedance diagrams for a power system network and to understand per unit quantities.	3	2	1	1
C310.2	Able to form aY bus and Z for a power system networks	3	2	1	1
C310.3	Able to understand the load flow solution of a power system using different methods.	3	2	1	1
C310.4	Able to find the fault currents for all types faults to provide data for the design of bus protective devices	3	2	1	1
C310.5	Able to find the sequence components of currents for unbalanced power system networks.	3	2	1	1
C310.6	Able to analyze the steady state, transient and dynamic stability concepts of a power system.	3	2	1	1

**Course Title: Micro Processor and Micro Controllers**

**Course Code: R1632023**

CO No	CO Statement	PO's
		PO3
C311.1	To be able to understand the microprocessor capability in general and explore the evaluation of microprocessors.	3
C311.2	To be able to understand the addressing modes of microprocessors	3
C311.3	To be able to understand the micro controller capability	3
C311.4	To be able to program mp and mc	3
C311.5	To be able to interface mp and mc with other electronic devices	3
C311.6	To be able to develop cyber physical systems	3

**Course Title: Data Structures**

**Course Code: R1632024**

CO No	CO Statement	PO's	
		PO1	PO4
C312.1	Distinguish between procedures and object oriented programming.	3	2
C312.2	Apply advanced data structure strategies for exploring complex data structures.	3	2
C312.3	Compare and contrast various data structures and design techniques in the area of Performance.	3	2
C312.4	Implement data structure algorithms through C++.	3	2
C312.5	Incorporate data structures into the applications such as binary search trees, AVL and B Trees	3	2
C312.6	Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs	3	2

**Course Title: Power Electronic Lab**

**Course Code: R1632026**

CO No	CO Statement	PO's	
		PO4	PSO1
C313.1	Able to study the characteristics of various power electronic devices and analyze gate drive circuits of IGBT.	3	1
C313.2	Able to analyze the performance of single-phase converters with both resistive and inductive loads.	3	1
C313.3	Able to analyze the performance of three-phase full-wave bridge converters with both resistive and inductive loads.	3	1
C313.4	Able to understand the operation of a single phase AC voltage regulator with resistive and inductive loads.	3	1
C313.5	Able to understand the working of Buck and Boost converter,	3	1
C313.6	Able to understand the working of single-phase square wave and PWM inverter.	3	1

**Course Title: Micro Processor and Micro Controllers Laboratory**

**Course Code: R1632027**

CO No	CO Statement	PO's	
		PO4	PSO1
C314.1	Will be able to write assembly language programs using 8086 micro based on arithmetic, logical, and shift operations.	3	1
C314.2	Will be able to interface 8086 with I/O and other devices.	3	1
C314.3	Will be able to do parallel and serial communication using 8051	3	1
C314.4	Will be able to do parallel and serial communication using PIC 18 microcontrollers	3	1
C314.5	Able to perform different operations using microprocessors	3	1
C314.6	Able to perform Reading and Writing operations on a parallel port using 8051	3	1

**Course Title: Data Structures Laboratory**

**Course Code: R1632028**

CO No	CO Statement	PO's	
		PO4	PSO1
C315.1	Be able to design and analyze the time and space efficiency of the data structure	3	1
C315.2	Be capable to identity the appropriate data structure for given problem	3	1
C315.3	Have practical knowledge on the application of data structures	3	1
C315.4	Able to implement different search techniques	3	1
C315.5	Able to implement different linked list	3	1
C315.6	able to implement different algorithms	3	1

**Course Title: Utilization of Electrical Energy**

**Course Code: R1641021**

CO No	CO Statement	PO's			
		PO1	PO2	PO3	PSO1
C401.1	Identify a suitable motor for electric drives and industrial applications	3	1	2	1
C401.2	Identify most appropriate heating or welding techniques for suitable applications	3	1	2	1
C401.3	Understand various levels of illuminosity produced by different illuminating sources.	3	1	2	1
C401.4	Design different lighting systems by taking inputs and constraints in view for different layouts.	3	1	2	1
C401.5	Understand the speed/time characteristics of different types of traction motors.	3	1	2	1
C401.6	Estimate energy consumption levels at various modes of operation.	3	1	2	1

**Course Title: Linear Integrated Circuit Analysis**

**Course Code: R1641022**

CO No	CO Statement	PO's			
		PO1	PO2	PO3	PSO1
C402.1	Design circuits using operational amplifiers for various applications.	3	2	3	1
C402.2	Analyze and design amplifiers and active filters using Op-amp.	3	2	3	1
C402.3	Diagnose and trouble-shoot linear electronic circuits.	3	2	3	1
C402.4	Understand the gain-bandwidth concept and of amplifier configurations.	3	2	3	1
C402.5	Understand the frequency response of the amplifier configurations.	3	2	3	1
C402.6	Understand thoroughly the operational amplifiers with linear integrated circuits	3	2	3	1

**Course Title: Power System Optimization and Control**

**Course Code: R1641023**

CO No	CO Statement	PO's				
		PO1	PO2	PO3	PO6	PSO1
C403.1	Able to compute optimal scheduling of Generators.	3	2	3	1	1
C403.2	Able to understand hydrothermal scheduling.	3	2	3	1	1
C403.3	Understand the unit commitment problem.	3	2	3	1	1
C403.4	Able to understand the importance of the frequency.	3	2	3	1	1
C403.5	Understand the importance of PID controllers in single area and two area systems.	3	2	3	1	1



C403.6	Will understand reactive power control and compensation for transmission lines.	3	2	3	1	1
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**Course Title: Switch Gear and Protection**

**Course Code: R1641024**

CO No	CO Statement	PO's	
		PO1	PO2
C404.1	Able to understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF gas type.	3	2
C404.2	Ability to understand the working principle and operation of different types of 6 electromagnetic protective relays.	3	2
C404.3	Students acquire knowledge of faults and protective schemes for high power generators and transformers.	3	2
C404.4	Improves the ability to understand various types of protective schemes used for feeders and bus bar protection.	3	2
C404.5	Able to understand different types of static relays and their applications.	3	2
C404.6	Able to understand different types of overvoltages and protective schemes required for insulation co-ordination.	3	2

**Course Title: SIMULATION LAB**

**Course Code: R1641027**

CO No	CO Statement	PO's	
		PO4	PSO1
C407.1	Able to simulate integrator and differentiator circuit	3	2
C407.2	Able to simulate Boost,Buck and full convertor	3	2
C407.3	Able to simulate transmission line by incorporating line, load and transformer models.	3	2
C407.4	Able to perform transient analysis of RLC circuit and	3	2
C407.5	Able to perform transient analysis on a single machine connected to an infinite bus (SMIB).	3	2
C407.6	Able to plot Bode plots, root locus and nyquist plots for the transfer functions of systems up to 5th order	3	2

**Course Title: POWER SYSTEM & SIMULATION LAB**

**Course Code: R1641028**

CO No	CO Statement	PO's	
		PO4	PSO1
C408.1	Able to determine the parameters of various power system components which are frequently occur in power system studies	3	2
C408.2	Able to execute energy management systems functions at load dispatch centers.	3	2
C408.3	Able to determine various parameters of a transmission line	3	2
C408.4	Able to run low flow studies analysis using different methods	3	2
C408.5	Able to determine di-electric strength of a transformer oil	3	2
C408.6	Able to determine economic load dispatch with and without control	3	2

**Course Title: Digital Control Systems**

**Course Code: R1642021**

CO No	CO Statement	PO's	
		PO3	PSO1
C409.1	The students learn the advantages of discrete time control systems and the “know how” of various associated accessories.	3	2
C409.2	The learner understands z-transformations and their role in the mathematical analysis of different systems(like Laplace transforms in analog systems).	3	2
C409.3	The stability criterion for digital systems and methods adopted for testing the same are explained.	3	2
C409.4	Finally, the conventional and state space methods of design are also introduced.	3	2
C409.5	Able to design discrete time control systems using conventional methods	3	2
C409.6	Able to design state feedback controller	3	2

**Course Title: HVDCT**

**Course Code: R1642022**

CO No	CO Statement	PO's			
		PO2	PO7	PO10	PSO1
C410.1	Learn different types of HVDC levels and basic concepts	3	1	2	1
C410.2	Know the operation of converters	3	1	2	1
C410.3	Acquire control concept of reactive power control and AC/DC load flow.	3	1	2	1
C410.4	Understand converter faults, protection and harmonic effects	3	1	2	1
C410.5	Design low pass and high pass filters	3	1	2	1
C410.6	Design high pass filters	3	1	2	1

**Course Title: EDS**

**Course Code: R1642023**

CO No	CO Statement	PO's			
		PO1	PO2	PO10	PSO1
C411.1	Understand various factors of the distribution system.	3	2	2	1
C411.2	Design the substation and feeders.	3	2	2	1
C411.3	Determine the voltage drop and power loss	3	2	2	1
C411.4	Understand the protection and its coordination.	3	2	2	1
C411.5	Examine the effect of compensation for p.f improvement.	3	2	2	1
C411.6	Study the effect of voltage control.	3	2	2	1

**Department of Electronics and Communication Engineering**

**Curriculum under Academic Regulation 2016 of JNTUK Kakinada**

**Course Title: English-I**

**Course code: R161101**

CO No	CO Statement	POs
		PO10
C101.1	Develop their knowledge different fields and serve the society accordingly and acquire writing skills	3
C101.2	Motivates the public to adopt road safety measures and acquire writings skills	3
C101.3	Create an awareness in the readers that mass production is ultimately detrimental to biological survival and acquire writing skills	3
C101.4	Choose a source of energy suitable for rural India and writing skills	3
C101.5	Highlight the fact that animals must be preserved because animal life is precious and acquire writings skills	3
C101.6	Identifying safety measures against different of accidents at home and in the workplace and acquire writings skills	3

**Course Title: Mathematics – I**

**Course code: R161102**

CO No	CO Statement	POs
		PO1
C102.1	Solve linear differential equations first order	3
C102.2	Solve analytically a wide range of higher order differential equations with constant coefficients	3
C102.3	Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE	3
C102.4	Calculate the total derivative, Jacobian and extreme values of a function of two variables	3
C102.5	Solve problems related to basic linear and non - linear equations	3
C102.6	Solve higher order partially differential equations with constant coefficients and classify second order PDE	3

**Course Title: Mathematics – II**

**Course code: R161103**

CO No	CO Statement	POs
		PO1
C103.1	Calculate a root of algebraic and transcendental equations. Explain relation between the finite Difference operators	3
C103.2	Compute interpolating polynomials for the given data.	3
C103.3	Solve ordinary differential equations numerically using Euler's and RK method	3
C103.4	Find Fourier series for certain functions	3
C103.5	Identify/classify and solve the different types of partial differential equations	3
C103.6	Find Fourier Transforms and Finite Fourier transforms for certain functions	3

**Course Title: Applied Physics**

**Course code: R161104**

CO No	CO Statement	POs	
		PO1	PO3
C104.1	Illustrate the principles of interference of light	3	1
C104.2	Demonstrate the diffraction of light	3	1
C104.3	Apply the concepts of light for optical communication	3	1
C104.4	Summarize the Principles and Propagation of EM Waves	3	1
C104.5	Apply Quantum mechanics to study the behaviour of a particles	3	1
C104.6	Identify the appropriate solid state materials for engineering applications	3	2

**Course Title: Computer Programming**

**Course code: R161107**

CO No	CO Statement	POs
		PO1
C105.1	Summarize the basics concepts of computers	3
C105.2	Describe the basic concepts of C	3
C105.3	Develop programs using control structures	3
C105.4	Create the programs using functions in C	3
C105.5	Explain the concepts of arrays and strings	3
C105.6	Build C programs using files and dynamic memory allocation	3

**Course Title: Engineering Drawing**

**Course code: R161113**

CO No	CO Statement	POs		
		PO1	PO5	PO10
C106.1	Draw regular polygons and engineering curves by different methods using drawing instruments and Employ scales to represent engineering data	3	3	3
C106.2	Apply the principle of orthographic projection in projecting points and lines in simple positions	3	3	3
C106.3	Construct projection of straight lines in inclined positions and use the fundamental principles in the determination of true length, angles of inclinations and locating traces	3	3	3
C106.4	Apply the basic principles to draw projections of regular planes in simple and inclined positions	3	3	3
C106.5	Draw the projection of various types of solids in different simple position including inclination to one of the planes	3	3	3
C106.6	Distinguish orthographic and isometric views and represent the isometric views of an object and convert orthographic views to isometric views and vice- versa	3	3	3

**Course Title: English Communication Skills Lab-I**

**Course code: R161114**

CO No	CO Statement	POs	
		PO5	PO10
C107.1	Apply different language functions and phrases at different situations to communicate with people.	1	3
C107.2	Translate English phonemes into graphemes and graphemes into phonemes.	1	3

C107.3	Build confidence and develop communication skills with proper pronunciation.	1	3
C107.4	Able to communicate in formal and informal situations.	1	3
C107.5	To Cultivate communicative Competence.	1	3
C107.6	To make them ready for Industry.	1	3

**Course Title: Applied / Engineering Physics Laboratory**

**Course code: R161115**

CO No	CO Statement	POs	
		PO1	PO4
C108.1	Determine the relevant Physical Quantities from experimental measurements	3	1
C108.2	Apply the principles and concepts using devices and compare results with theoretical calculations	3	1
C108.3	Make use of graphical analysis to the experimental data for estimation of physical quantities	3	1
C108.4	Distinguish the characteristics of materials in a practical manner and gain knowledge of its usage	3	1
C108.5	Develop the laboratory skills in handling of electrical and optical instruments	3	1
C108.6	Demonstrate the interference and diffraction phenomena of light	3	1

**Course Title: Engineering Workshop & IT Workshop**

**Course code: R161117**

CO No	CO Statement	POs
		PO4
C109.1	Identify different tools used in various trades of engineering workshop	3
C109.2	Fabricate different joints in carpentry and develop various types of fits in fitting trade	3
C109.3	Form simple parts in blacksmithy and also fabricate simple objects in tin smithy .	3
C109.4	Employ the principle of electrical wiring for simple applications like series and parallel wiring.	3
C109.5	Practice the carpentry modules such as lap, dovetail, mortise, tenon joint etc.	3
C109.6	Explain the tools & connections pertaining to house wiring, stair case wiring	3

**Course Title: English – II**

**Course code: R161201**

CO No	CO Statement	POs
		PO10
C110.1	Lesson Underscores that the ultimate aim of education is to enhance wisdom and Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps	3
C110.2	Enables the students to promote peaceful co-existence and universal harmony among people and society and achievements of C V Raman are inspiring and exemplary to the readers and all scientists	3
C110.3	Manage different cultural shocks due to globalization and the seminal contributions of Homi Jehangir Bhaba to Indian nuclear programme provide an aspiration to the readers to serve the nation and strengthen it.	3
C110.4	Projets society's need to re-examine its traditions when they are out dated and the scientific discoveries and inventions of Jagadish Chandrabose provide	3

	inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.	
C110.5	Protect environment for the sustainability of the future generations and Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader	3
C110.6	Get inspired by eminent personalities who toiled for the present day advancement of software development and the lesson about Srinivasa Ramanujan provides inspiration to the readers to think and tap their innate talents	3

**Course Title: Mathematics -III**

**Course code: R161203**

CO No	CO Statement	POs
		PO1
C111.1	Determine rank, Matrix inverse solve linear systems and simultaneous equations	3
C111.2	Use the characteristic polynomial to compute the eigen values and eigen vectors of a square matrix and use them to diagonalise matrices	3
C111.3	Tracing curves in cartesian and polar form. Determine double integral a region and triple integral over a volume	3
C111.4	To evaluate improper integrals using beta and gamma functions	3
C111.5	Calculate the gradient of a scalar function, divergence and curl of a vector function	3
C111.6	Determine line, surface and volume integrals. Apply Greens, Gauss, Stokes theorems to calculate line, surface and volume integrals	3

**Course Title: Applied Chemistry**

**Course code: R161211**

CO No	CO Statement	POs
		PO1
C112.1	Outline the properties of polymers and various additives added and different methods of forming plastic materials	3
C112.2	Define the various fuels and their occurrences, synthesis and purifications	3
C112.3	Explain the theory of constructions of battery and fuel cells and the reasons for corrosion and study some methods of corrosion control	3
C112.4	Identify the synthesizing, Nanomaterials and their applications in industry	3
C112.5	Apply the conduct experiments, as well as to organize, analyze, and interpret data	3
C112.6	Design sources of energy by different natural sources	3

**Course Title: Electrical and Mechanical Technology**

**Course code: R161214**

CO No	CO Statement	POs
		PO1
C113.1	Analyse the various Electrical Networks.	3
C113.2	Analyse the performance of transformers.	2
C113.3	Study the working principles of DC motor and Induction motors.	2
C113.4	Study the working principles of I.C. Engines	2
C113.5	Study different Modes of Heat transfer.	2
C113.6	Study power transmission by drives and different manufacturing methods.	2

**Course Title: Environmental Studies**

**Course code: R161212**

CO No	CO Statement	POs	
		PO1	PO6
C114.1	Outline the natural resources and their importance for the sustenance of life and recognize the need to conserve the natural resources and need for protecting the producers, consumers in various ecosystems	1	3
C114.2	Explain the biodiversity of India and the threats to biodiversity and conservation practices to protect the biodiversity	1	3
C114.3	Identify various attributes of pollution and their impacts and the measures to reduce or control the pollution with waste management	1	3
C114.4	Illustrate the social issues of the environmental legislations of India and the first global initiatives towards sustainable Development	1	3
C114.5	Design about Environmental Assessment and the stages involved in EIA and Environmental Audit	1	3
C114.6	Create self-sustaining green campus with environmentally friendly aspects of energy, water and waste water reuse plantation, rain water harvesting and parking curriculum	1	3

**Course Title: Data Structures**

**Course code: R161213**

CO No	CO Statement	POs
		PO1
C115.1	Summarize the oops concepts and the application of arrays	3
C115.2	Apply templates in implementation and application of stacks	3
C115.3	Develop programs using linked lists and dictionaries	3
C115.4	Design programs on various tree data structures	3
C115.5	Apply graph concepts on various algorithms	3
C115.6	Apply various searching and sorting techniques on given data.	3

**Course Title: Applied / Engineering Chemistry Laboratory**

**Course code: R161227**

CO No	CO Statement	POs	
		PO1	PO4
C116.1	Identify the professional course have practically very little exposure to the lab classes	2	3
C116.2	Demonstrate the experiments of introduce to the volumetric analysis	2	3
C116.3	An ability to gain technical Knowledge of measuring ,operating and testing of chemical instruments and equipment	2	3
C116.4	Calculate the hardness of water	2	3
C116.5	Determine the functioning of the pH instruments	2	3
C116.6	Determine the functioning of the Potentiometric meters	2	3

**Course Title: English Communication Skills Lab-2**

**Course code: R161221**

CO No	CO Statement	POs
		PO10
C117.1	Become successful in the competitive world	3
C117.2	Develop communication and presentations skills	3
C117.3	Demonstrate appropriate skills and experience in interviews, e-mail, CV writing	3
C117.4	Able to communicate in formal and informal situations	3

C117.5	To Cultivate communicative Competence	3
C117.6	To make them ready for Industry	

**Course Title: Computer Programming Lab**

**Course code: R161228**

CO No	CO Statement	POs	
		PO1	PO4
C118.1	Execute programs in Linux environment	2	3
C118.2	Demonstrate the usage of basic concepts includes variables, operators & control statements	2	3
C118.3	Implement the concepts of functions	2	3
C118.4	Implement the concepts of Arrays and Strings	2	3
C118.5	Implement the concepts of Pointers & Structures	2	3
C118.6	Demonstrate the use of Files	2	3

**Course Title: Electronic Devices and Circuits**

**Course code: R1621041**

CO No	CO Statement	POs		
		PO1	PO3	PO10
C201.1	Apply the fundamentals of semiconductor theory to analyze the characteristics of p-n junction diode and Special diodes	2	2	2
C201.2	Analyze rectifier circuits with & without filters.	2	3	2
C201.3	Illustrate the characteristics of Bipolar junction transistor (BJT) and compare three configurations.	3	3	2
C201.4	Illustrate the characteristics of Field effect transistor (FET) and compare JFET and MOSFET	2	3	2
C201.5	Design of biasing circuits for BJTs & FETs	2	2	2
C201.6	Analyze small signal low frequency models of amplifier circuits.	3	2	2

**Course Title: Switching Theory and Logic Design**

**Course code: R1621042**

CO No	CO Statement	PO1	POs	PO3
C202.1	Understand number systems, arithmetical and logical binary operations with different binary codes.	3		1
C202.2	Explain switching algebra theorems and apply them for logic functions	2		1
C202.3	Identify the importance of SOP and POS canonical forms in the minimization or other optimization of Boolean formulas in general and digital circuits.	3		2
C202.4	Discuss about digital logic gates and their properties.	3		3
C202.5	Evaluate functions using various types of minimizing algorithms like Boolean algebra, Karnaugh map or tabulation method.	3		1
C202.6	Analyze the design procedures of Combinational & sequential logic circuits.	2		3

**Course Title: Signals and Systems**

**Course code: R1621043**

CO No	CO Statement	POs		
		PO1	PO2	PO4
C203.1	Outline the basic concepts of signals and systems	2	1	2
C203.2	Analyze the spectral characteristics of Continuous Time and Discrete Time periodic and aperiodic signals using Fourier analysis.	2	3	2
C203.3	Analyze system properties based on impulse response and Fourier analysis	3	3	2
C203.4	Classify systems based on their properties and determine the response of LTI systems using convolution and also understand the concept of correlation between signals.	2	2	2



C203.5	Apply Z- transforms for analysing discrete-time signals and systems	2	1	2
C203.6	Outline the process of sampling and the effects of under sampling	3	1	2

**Course Title: Network Analysis**

**Course code: R1621044**

CO No	CO Statement	POs			
		PO 1	PO 3	PO 10	PSO1
C204.1	Understand the axiomatic formulation of modern probability theory	2	2	1	1
C204.2	Characterize Probability Models and functions of Random variables based on single and multiple random variables	2	2	1	1
C204.3	Evaluate and apply moments and characteristic functions and understand the concept of Inequalities and probabilistic limits.	2	2	2	1
C204.4	Understand the concept of Random process and determine covariance and spectral density of stationary random processes.	2	3	1	1
C204.5	Demonstrate the specific applications to Poisson and Gaussian process and representation of low pass and band pass noise models.	2	2	1	1
C204.6	Analyze the response of random inputs to linear time invariant systems.	2	3	2	1

**Course Title: Random Variables and Stochastic Process**

**Course code: R1621045**

CO No	CO Statement	POs		
		PO1	PO2	PO4
C205.1	Understand the axiomatic formulation of modern probability theory	2	2	1
C205.2	Characterize Probability Models and functions of Random variables based on single and multiple random variables	2	2	1
C205.3	Evaluate and apply moments and characteristic functions and understand the concept of Inequalities and probabilistic limits.	2	2	2
C205.4	Understand the concept of Random process and determine covariance and spectral density of stationary random processes.	2	3	1
C205.5	Demonstrate the specific applications to Poisson and Gaussian process and representation of low pass and band pass noise models.	2	2	1
C205.6	Analyze the response of random inputs to linear time invariant systems.	2	3	2

**Course Title: Managerial Economics & Financial Analysis**

**Course code: R1621026**

CO No	CO Statement	POs
		PO11
C206.1	Understand nature of managerial economics and analyse demand and supply concept	3
C206.2	Apply break even analysis on productions	3
C206.3	Familiarise with different marketing strategies on prices	3
C206.4	Explain business and phases of business life cycle	3
C206.5	Apply different technical accounting statements to various rating	3
C206.6	Explain budgets and its applications	3

**Course Title: Electronic Devices and Circuits Lab**

**Course code: R1621047**

CO No	CO Statement	POs
		PO4
C207.1	Apply the concepts of different electronic devices to verify their characteristics and measure the important parameters	3

C207.2	Analyze the performance of rectifier circuits with and without filters.	3
C207.3	Design of biasing circuits for BJT	3
C207.4	Analyze the performance of BJT and FET amplifier circuits	3
C207.5	Analyse the characteristics of SCR and UJT	3
C207.6	Design and Analyse the Emitter follower amplifier.	3

**Course Title: Networks & Electrical Technology Lab**

**Course code: R1621048**

CO No	CO Statement	POs	
		PO1	PO4
C208.1	Analyse RLC circuits and understand resonant frequency and Q-factor	3	3
C208.2	Determine first order RC/RL networks of periodic non- sinusoidal waveforms.	3	2
C208.3	Apply network theorems to analyze the electrical network	3	3
C208.4	Describe the performance of dc shunt machine.	2	2
C208.5	Investigate the performance of 1-phase transformer.	3	2
C208.6	Perform tests on 3-phase induction motor and alternator to determine their performance characteristic	2	2

**Course Title: Electronic Circuit Analysis**

**Course code: R1622041**

CO No	CO Statement	POs		
		PO1	PO 2	PO3
C209.1	Know the equivalent circuit of multistage amplifier and its analysis	2	3	1
C209.2	Identify the different feedback topologies and analyze them	2	2	1
C209.3	Explain the principle of oscillator and design different types of sinusoidal oscillators	2	2	1
C209.4	Define the difference between voltage and power amplifiers and design different classes	3	2	1
C209.5	Know that Tuned amplifiers amplify a narrow band of frequencies and will also be able to analyze them	2	3	1
C209.6	Identify that Op-amp not amplifies but also perform different operations and analyze some applications.	2	2	1

**Course Title: Control Systems**

**Course code: R1622042**

CO No	CO Statement	POs	
		PO3	PS01
C210.1	Ability to derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.	2	2
C210.2	Capability to determine time response specifications of second order systems and to determine error constants.	2	2
C210.3	Acquires the skill to analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method.	2	2
C210.4	Capable of analyzing the stability of LTI systems using frequency response methods.	2	2
C210.5	Able to design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.	2	2
C210.6	Ability to represent physical systems as state models and determine the response. Understanding the concepts of controllability and observability.	2	2

**Course Title: Electromagnetic Waves and Transmission Lines**

**Course code: R1622043**

CO No	CO Statement	POs				
		PO2	PO3	PO5	PO7	PSO1
C211.1	Determine E and H using various laws and applications of electric & magnetic fields	3	2	2	2	2
C211.2	Apply the Maxwell equations to analyze the time varying behaviour of EM waves	3	2	2	2	2
C211.3	Gain the knowledge in uniform plane wave concept and characteristics of uniform plane wave in various media	3	2	2	2	2
C211.4	Calculate Brewster angle, critical angle and total internal reflection	3	2	2	2	2
C211.5	Derive the expressions for input impedance of transmission lines	3	2	2	2	2
C211.6	Evaluate the reflection coefficient, VSWR etc. using smith chart	3	2	2	2	2

**Course Title: Analog Communication**

**Course code: R1622044**

CO No	CO Statement	POs		
		PO1	PO4	PSO1
C212.1	Understand the need for modulation and the basic elements of a communication system	3	3	3
C212.2	Express the concepts of Analog Modulation and Demodulation techniques	3	3	3
C212.3	Compare the performance of various analog modulation techniques in the presence of noise.	3	3	3
C212.4	Analyze different characteristics of transmitters	3	3	3
C212.5	Analyze different characteristics of receivers.	3	3	3
C212.6	Express the concepts of sampling and pulse modulation methods.	3	3	3

**Course Title: Pulse and Digital Circuits**

**Course code: R1622045**

CO No	CO Statement	POs			
		PO1	PO2	PO3	PO4
C213.1	To provide insight of the applications of Integrator, differentiator, clippers and clamper circuits.	3	2	2	2
C213.2	To introduce the design of various Multivibrators for various applications	2	2	2	2
C213.3	To introduce the design of various Time Base Generators	2	2	2	2
C213.4	To provide insight of the synchronization techniques for sweep circuits	2	2	2	2
C213.5	To introduce the design of various Blocking Oscillators for various applications	2	2	3	2
C213.6	To provide insight of different logic families & Realize logic gates using diodes and transistors.	2	2	1	1

**Course Title: Management Science**

**Course code:**

CO No	CO Statement	POs
		PO11
C214.1	Understand nature of managerial economics and analyse demand and supply concept	2
C214.2	Apply break even analysis on productions	2
C214.3	Familiarise with different marketing strategies on prices	2
C214.4	Explain business and phases of business life cycle	2
C214.5	Apply different technical accounting statements to various rating	2

C214.6	Explain budgets and its applications	2
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**Course Title: Electronic Circuit Analysis Lab**

**Course code: R1622046**

CO No	CO Statement	POs		
		PO4	PO5	PS01
C215.1	Determine of $F_t$ of a given transistor.	3	2	3
C215.2	Design, analyse and Simulate Voltage series and Current shunt Feedback amplifier.	3	2	3
C215.3	Design, analyse and Simulate Oscillators.	3	2	3
C215.4	Design, analyse and Simulate Multistage amplifiers.	3	2	3
C215.5	Design, analyse and Simulate Power amplifiers.	3	2	3
C215.6	Design, analyse and Simulate Tuned amplifiers.	3	2	3

**Course Title: Analog Communication Lab**

**Course code: R1622047**

CO No	CO Statement	POs		
		PO4	PO5	PS01
C216.1	Design and implement modulation and demodulation circuits for amplitude modulation technique.	2	2	3
C216.2	Analyse the frequency spectrum of Modulated signal obtain from AM and FM.	3	2	3
C216.3	Design and analyse Pre-emphasis and De-emphasis circuits.	3	2	3
C216.4	Design and implement modulation and demodulation circuits for frequency modulation technique.	3	2	3
C216.5	Construct the sampling circuit and verify the Nyquist criteria.	3	2	3
C216.6	Design and implement modulation and demodulation circuits for Pulse modulation technique.	3	2	3

**Course Title:**

**Course code: R16**

CO No	CO Statement	POs	
		PO1	PO2
C301.1	Summarise basic structure of computers	2	2
C301.2	Difference ate various instructions and addressing modes	2	2
C301.3	Identify various types of instructions	2	2
C301.4	Outline various input output organization in computer	2	2
C301.5	Demonstrate various memories in computer	2	2
C301.6	Explain control unit organization in CPU	2	2

CO No	CO Statement	POs	
		PO1	PO4
C302.1	Design circuits using operational amplifiers for various applications	3	3
C302.2	Analyse and design amplifiers and active filters using Op-amp.	3	3
C302.3	Diagnose and trouble-shoot linear electronic circuits	3	3
C302.4	Understand the gain-bandwidth concept and frequency response of the amplifier configurations	3	3
C302.5	Design and Analyse of various applications using IC 565 and IC 555.	3	3

C302.6	Understand the operation of Analog to Digital and Digital to Analog Converters	3	3
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CO No	CO Statement	POs	
		PO1	PO4
C303.1	Understand the structure of commercially available digital integrated circuit families.	3	3
C303.2	Learn the IEEE Standard 1076 Hardware Description Language (VHDL).	3	3
C303.3	Learn the Behavioral Modelling to design digital circuits using VHDL	3	3
C303.4	Analyse and design basic digital circuits with combinational using VHDL	3	3
C303.5	Analyse and design basic digital circuits with sequential logic circuits	3	3
C303.6	Analyse and Design Synchronous and Asynchronous Sequential Circuits	3	3

**Course Title: Digital Communication**

**Course code: R1631044**

CO No	CO Statement	POs		
		PO1	PO4	PS01
C304.1	Understand the concept of different modulation techniques.	2	2	2
C304.2	Understand the optimum detection and analyse the effect of noise in various digital communication systems	2	2	2
C304.3	Analyse the performance of spread spectrum communication system.	2	2	2
C304.4	Analyse the fundamental parameters relevant to information theory such as entropy, mutual information etc. and calculate the capacity of communication	2	2	2
C304.5	Implement different Source Coding Techniques	2	2	2
C304.6	Implement the encoder and decoder of Linear block codes, cyclic codes and convolution codes using different algorithms.	2	2	2

**Course Title: Antenna and Wave Propagation**

**Course code: R1631045**

CO No	CO Statement	POs				
		PO1	PO2	PO4	PO5	PSO1
C305.1	Identify basic antenna parameters.	3	1	2	2	2
C305.2	Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and microstrip antennas	2	3	2	2	2
C305.3	Quantify the fields radiated by various types of antennas	2	1	1	2	2
C305.4	Design and analyze antenna arrays	2	3	2	2	2
C305.5	Analyze antenna measurements to assess antenna's performance	2	3	2	3	2
C305.6	Identify the characteristics of radio wave propagation	2	3	2	1	2

**Course Title: Pulse and Digital Circuits Lab**

**Course code: R1631046**

CO No	CO Statement	POs
		PO4
C306.1	Design various linear circuits and analyze their response	2

C306.2	Design various non-linear circuits and analyze their response	2
C306.3	Design and generate various types of non-sinusoidal waveforms using multivibrators.	2
C306.4	Design various digital logic circuits.	2
C306.5	Design UJT relaxation oscillator and analyze their response	2
C306.6	Design Bootstrap sweep circuit and analyze their response	2

**Course Title: Linear IC Applications Lab**

**Course code: R1631047**

CO No	CO Statement	POs			
		PO 1	PO4	PO 5	PSO1
C307.1	Design and analyse the various linear application of op-amp.	3	3	2	1
C307.2	Design and analyse the various non-linear application of op-amp.	3	3	2	1
C307.3	Design and analyse filter circuits using op-amp	3	3	2	1
C307.4	Design and analyse oscillators and multivibrator circuits using op-amp	3	3	2	1
C307.5	Design and analyse the various application of 555 timer	3	3	2	1
C307.6	Design and analyse the various three terminal voltage regulators.	3	3	2	1

**Course Title: Digital IC Applications Lab**

**Course code: R1631048**

CO No	CO Statement	POs			
		PO 1	PO4	PO5	PSO1
C308.1	Verify the logic behavior of IC gates and implement the given Boolean functions using basic logic gates and/ or Universal gates	3	3	2	2
C308.2	Design, Analyze and Implement combinational circuits for given specifications	3	3	2	2
C308.3	Design, Analyze and Implement flip-flops and registers	3	3	2	2
C308.4	Design, Analyze and Implement counters to meet required specifications.	3	3	2	2
C308.5	Design, Analyze and Implement shift registers to meet required specifications.	3	3	2	2
C308.6	Design, Analyze and Implement ALU to meet required specifications.	3	3	2	2

**Course Title: Micro Processors & Micro Controllers**

**Course code: R1632041**

CO No	CO Statement	POs			
		PO 1	PO4	PO9	PSO2
C309.1	Understand and analyze architecture of the 8086 microprocessor	3	3	2	2
C309.2	Be familiar with the 8086 Assembly Language Programming	3	3	2	2
C309.3	Learn about Hardware and software requirements in interfacing and designing microprocessor based products for practical applications	3	3	2	2
C309.4	Be familiar with basics of 16 bit & 32 bit microprocessors	3	3	2	2
C309.5	Understand and analyze architecture of 8051 and assembly language Programming of 8051	3	3	2	2
C309.6	Be familiar with the basics of PIC and Arm 32-bit Microcontrollers	3	3	3	2

**Course Title: Microwave Engineering**

**Course code:R1632042**

CO No	CO Statement	POs			
		PO1	PO2	PO3	PSO1
C310.1	Explain different types of waveguides and their respective modes of propagation.	2	2	3	2
C310.2	Study modes in circular wave waveguides and analyse different parameters of microstrip lines.	2	2	3	2
C310.3	Analyse the different characteristics of microwave tubes.	2	2	3	2
C310.4	Study and Analyse the characteristics of Helix TWTs and M-Type Tubes	2	2	3	2
C310.5	Calculate S-matrix for various waveguide components and splitting the microwave energy in a desired direction	2	2	3	2
C310.6	Distinguish between Microwave tubes and Solid State Devices and to measure various microwave parameters using a Microwave test bench	2	2	3	2

**Course Title: VLSI Design**

**Course code:R1632043**

CO No	CO Statement	POs				
		PO 1	PO 2	PO 3	PSO1	PSO2
C311.1	To describe different MOSFETs and the fabrication steps for nMOS, CMOS and BiCMOS circuits	2	1	2	2	3
C311.2	To illustrate circuit diagrams, stick diagrams and layouts for nMOS, CMOS and BiCMOS circuits	2	1	2	3	3
C311.3	To describe Sheet resistance, capacitance and delay of MOS based circuits	2	3	2	2	2
C311.4	Evaluate different scaling factors of MOS circuits	2	3	2	2	2
C311.5	Design of combinational circuits using switch logic.	2	2	3	2	2
C311.6	Design of ALU subsystem and describe different memory elements, registers.	2	1	2	3	2

**Course Title: Digital Signal Processing**

**Course code: R1632044**

CO No	CO Statement	POs				
		PO1	PO2	PO3	PSO1	PSO2
C312.1	Apply the difference equations concept in the analyzation of Discrete time systems	2	2	3	2	2
C312.2	Use the FFT algorithm for solving the DFT of a given signal	2	2	3	2	2
C312.3	Design a Digital filter (FIR&IIR) from the given specifications	2	2	3	2	2
C312.4	Realize the FIR and IIR structures from the designed digital filter.	2	2	3	2	2
C312.5	Use the Multirate Processing concepts in various applications (eg: Design of phase shifters, Interfacing of digital systems	2	2	3	2	2
C312.6	Apply the signal processing concepts on DSP Processor.	2	2	3	2	2

**Course Title: Micro Processors & Micro Controllers Lab**

**Course code: R1632046**

CO No	CO Statement	POs
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		PO4	PO9	PS02
C313.1	Design and implement programs on 8086 microprocessors.	3	2	2
C312.2	Generation of waveforms using Intel 8253/8254	3	2	2
C312.3	Design interfacing circuits with 8086	3	2	2
C312.4	Design and implement 8051 microcontroller-based systems	3	2	2
C312.5	To Understand the concepts related to I/O and memory interfacing	3	2	2
C312.6	Design interfacing circuits with 8051	3	2	2

**Course Title: VLSI Lab**

**Course code: R1632047**

CO No	CO Statement	POs		
		PO4	PO5	PS02
C314.1	Design Implementation of Logic gates	3	3	3
C314.2	Design and implementation of Adder and Subtractor	3	3	3
C314.3	Design and implementation of Decoder	3	3	3
C314.4	Design and implementation of Latches	3	3	3
C314.5	Design and implementation of Asynchronous counter	3	3	3
C314.6	Design and implementation of 8 bit DAC	3	3	3

**Course Title: Digital Communication Lab**

**Course code: R1632048**

CO No	CO Statement	POs		
		PO4	PO5	PS01
C315.1	Analyze the modulated signals using PCM and DPCM techniques.	2	2	2
C315.2	Analyze the modulated signals using Digital modulation techniques.	2	2	2
C315.3	Analyze the process of Companding.	2	2	2
C315.4	Demonstrate the Source encoder and Decoder.	2	2	2
C315.5	Demonstrate the error detection and error correction in linear convolution codes.	2	2	2
C315.6	Demonstrate the error detection and error correction in Binary cyclic codes	2	2	2

**Course Title: Radar Systems**

**Course code: R1641041**

CO No	CO Statement	POs		
		PO1	PO2	PO3
C401.1	Able to understand the basic working principles of various Radars	3	1	1
C401.2	Apply various mathematical equations to measure the Range and angle information of the targets from the radar	2	3	2
C401.3	Analyze and design of radar signals, MTI, Pulse Doppler radar and Delay line cancellers.	1	3	2
C401.4	Analyze various tracking Radars, advantages, limitations and their applications.	2	3	2
C401.5	To understand how to detect signals in noise.	2	2	1
C401.6	To understand various types of RADAR receivers.	2	1	1

**Course Title: Digital Image Processing**

**Course code: R1641042**

CO No	CO Statement	POs
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		PO1	PO2	PO3
C402.1	Review the fundamental concepts of a digital image processing system	3	2	1
C402.2	Analyze images in the frequency domain using various transforms.	2	3	1
C402.3	Evaluate the techniques for image enhancement and image restoration	3	2	1
C402.4	Interpret Image compression standards	1	2	1
C402.5	Categorize various compression techniques	2	2	1
C402.6	Interpret image segmentation and representation techniques.	2	2	1

**Course Title: Computer Networks**

**Course code: R1641043**

CO No	CO Statement	POs	
		PO1	PO2
C403.1	Illustrate different network topologies layers of the OSI model, TCP/IP model	2	1
C403.2	Illustrate different switching mechanisms	2	1
C403.3	Illustrate error control and flow control techniques.	2	1
C403.4	Illustrate Access control mechanisms	2	1
C403.5	Illustrate congestion control algorithms and different types of network devices and their functions within a network	2	1
C403.6	Explain Transport layer Protocols, Electronic-mail	2	1

**Course Title: Optical Communications**

**Course code:R1641044**

CO No	CO Statement	POs		
		PO1	PO2	PO3
C404.1	Classify different structures of optical fibre and types.	1	2	1
C404.2	Discuss the channel impairments like losses and dispersion.	2	2	1
C404.3	Analyze various coupling losses	2	3	1
C404.4	Distinguish the optical sources and detectors.	2	2	1
C404.5	Explain the operation of Optical transmitter and Receiver	2	2	1
C404.6	Apply the basics of fibre optics for link design and discuss fibre optic network Component.	3	2	2

**Course Title: Micro Wave Engineering & Optical Lab**

**Course code: R1641047**

CO No	CO Statement	POs		
		PO4	PO5	PSO1
C405.1	Perform the characteristics of microwave sources	3	2	2
C405.2	Build a microwave bench for measuring various parameters.	2	2	2
C405.3	Analyse the Reflex Klystron and Gunn diode characteristics.	3	2	2
C405.4	Demonstrate an experiment using microwave bench to measure S parameters of Circulator and Magic TEE	2	2	2
C405.5	Perform the characteristics of optical sources and detectors	3	2	2
C405.6	Measurement of NA and losses in Analog optical link	3	2	2

**Course Title: Digital Signal processing Lab**

**Course code:R1641048**

CO No	CO Statement	POs			
		PO4	PO5	PSO1	PSO2
C406.1	Understand the handling of discrete/digital signals using MATLAB	2	2	2	1
C406.2	Understand the basic operations of Signal processing	1	1	1	1

C406.3	Analyse the spectral parameter of window functions	2	2	2	2
C406.4	Design IIR, and FIR filters for band pass, band stop, low pass and high pass filters.	2	2	2	2
C406.5	Design the signal processing algorithm using MATLAB	3	3	3	3
C406.6	Design an algorithm to compute the edge of an image using spatial filters.	3	3	3	3

**Course Title: Cellular Mobile Communication**

**Course code: R1642041**

CO No	CO Statement	POs		
		PO1	PO2	PO3
C407.1	Discuss the basic implementation of cellular mobile communication	3	1	1
C407.2	Discuss different components in cellular system and their impacts on wireless Communication.	2	2	1
C407.3	Analyse mobile radio propagation fading concepts	2	2	1
C407.4	Estimate Modelling of different propagation environment	2	2	1
C407.5	Classify Multiple accesses and their performances	1	2	1
C407.6	To have a knowledge of different types of handoffs and their implementation process.	2	2	1

**Course Title: Electronic Measurements and Instrumentation**

**Course code: R1642042**

CO No	CO Statement	POs	
		PO1	PO5
C408.1	Select the instrument to be used based on the requirements.	3	2
C408.2	Evaluate basics of measurement systems, principle of basic meter	2	1
C408.3	Use bridges of many types and measure appropriate parameters	2	1
C408.4	Evaluate how a signal can be generated using different types of meters.	2	2
C408.5	Investigate a signal / waveform with different oscillators	2	1
C408.6	Design different transducers for measurement of different parameters.	2	1

**Course Title: Satellite Communication**

**Course code: R1642043**

CO No	CO Statement	POs		
		PO1	PO2	PO3
C409.1	Understand the concepts, applications and subsystems of Satellite communications.	2	1	1
C409.2	Understand the satellite subsystem.	2	2	1
C409.3	Design Satellite link according to the specifications.	2	2	3
C409.4	Understand the various types of multiple access techniques.	2	2	1
C409.5	Learn Earth station Technology architecture of earth station design.	2	2	3
C409.6	Understand the concepts of GPS and its architecture.	2	2	2

**Department of Computer Science and Engineering**

**Curriculum under Academic Regulation 2016 of JNTUK Kakinada**

<b>Course Title: English-I</b>		<b>Course Code: R161101</b>
<b>CO No</b>	<b>CO Statement</b>	<b>POs</b>
		<b>PO10</b>
C101.1	Illustrate and interpret human resources and their role in an organization or an industry and ideal family relations too.	3
C101.2	Relate and develop transport problems and solutions and also make use of one's life for country safety.	3
C101.3	Recall his/her education to relate contemporary technology its impact and to be model himself/herself as a successful one.	3
C101.4	Identify and explain various alternatives of energy sources and build constructive characteristics to be honest.	3
C101.5	Relate and out-line how many species are in endanger due to human activities and to utilize ones property for nation development	3
C101.6	Utilise industrial training to take safety measure at work.	3

<b>Course Title: Mathematics-I</b>		<b>Course Code: R161102</b>
<b>CO No</b>	<b>CO Statement</b>	<b>POs</b>
		<b>PO1</b>
C102.1	Solve linear differential equations first order	3
C102.2	Solve analytically a wide range of higher order ordinary differential equations with constant coefficients	3
C102.3	Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE	3
C102.4	Calculate the total derivative, Jacobian and extreme values of a function of two variables	3
C102.5	Solve problems related to basic linear and non-linear partial differential equations	3
C102.6	Solve higher order partially differential equations with constant coefficients and classify second order PDE.	3

<b>Course Title: Mathematics-II</b>		<b>Course Code: R161109</b>
<b>CO No</b>	<b>CO Statement</b>	<b>POs</b>
		<b>PO1</b>
C103.1	Calculate a root of algebraic and transcendental equations. Explain relation between the finite Difference operators.	3
C103.2	Compute interpolating polynomial for the given data.	3
C103.3	Solve ordinary differential equations numerically using Euler's and RK method.	3
C103.4	Evaluate Fourier series for certain functions.	3
C103.5	Identify/classify and solve the different types of partial differential equations.	3
C103.6	Evaluate Fourier Transforms and Finite Fourier transforms for certain functions.	3

Course Title: Applied Physics		Course Code: R161104
CO No	CO Statement	POs
		PO1
C104.1	Illustrate the principles of interference of light.	3
C104.2	Demonstrate the diffraction of light.	3
C104.3	Apply the concepts of light for optical communication.	3
C104.4	Demonstrate the Principles of sound and its applications in engineering	3
C104.5	Analyze structures and hence the properties of solid-state materials and concepts of nuclear energy.	3
C104.6	Classify the Magnetic materials, Dielectric materials and their properties.	3

Course Title: Computer Programming		Course Code: R161107
CO No	CO Statement	POs
		PO1
C105.1	Summarize the basics concepts of computers	3
C105.2	Describe the basic concepts of C	3
C105.3	Develop programs using control structures	3
C105.4	Create the programs using functions in C	3
C105.5	Explain the concepts of arrays and strings	3
C105.6	Build C programs using files and dynamic memory allocation	3

Course Title: Engineering Drawing		Course Code: R161112		
CO No	CO Statement	POs		
		PO1	PO5	PO10
C106.1	Understand use and the application of drawing instruments and to construct the polygons, curves and various types of scales	2	1	3
C106.2	Apply orthographic projections and to project the points and lines parallel to one plane and inclined to other.	2	1	3
C106.3	Apply the basic principles projections of the lines inclined to both the planes.	2	1	3
C106.4	Understand and draw the projections of the plane inclined to both the planes.	2	1	3
C106.5	Analyse and draw the projections of the various types of solids in different positions inclined to one of the planes.	2	1	3
C106.6	Create object in 3D view through isometric views and able to represent and convert the isometric view to orthographic view and vice versa	2	1	3

Course Title: English Communication Skills Lab - 1		Course Code: R161114	
CO No	CO Statement	POs	
		PO1	PO10
C107.1	Developed better understanding nuances of English Language through audio –visual experience and group activities	2	3
C107.2	Learnt to use neutralization of accent for intelligibility	2	3

C107.3	Implement suitable strategies for scanning the idea of the text so as to be able to find exact information	2	3
C107.4	Improved communicative competence that include clarity and confidence which in turn enhances their employability skills and ability to communicate in formal and informal situations	2	3
C107.5	To Cultivate communicative Competence	2	3
C107.6	To make them ready for Industry	2	3

<b>Course Title:</b> Applied /Engineering Physics Lab		<b>Course Code:</b> R161115	
<b>CO No</b>	<b>CO Statement</b>	<b>POs</b>	
		PO1	PO4
C108.1	Relate the principle of physics in engineering field and compare the results with theoretical calculations	2	3
C108.2	Understand modern engineering physics techniques and tools in real time applications in engineering studies	2	3
C108.3	Distinguish the characteristics of materials in a practical manner and gain knowledge of its usage	2	3
C108.4	Develop the laboratory skills in handling of electrical and optical instruments	2	3
C108.5	Demonstrate the interference and diffraction phenomena of light	2	3
C108.6	Applications of principles of light for optical communications.	2	3

<b>Course Title:</b> Computer Programming Lab		<b>Course Code:</b> R161119	
<b>CO No</b>	<b>CO Statement</b>	<b>POs</b>	
		PO1	PO4
C109.1	Execute programs in Linux environment	2	3
C109.2	Demonstrate the usage of basic concepts includes variables, operators & control statements	2	3
C109.3	Implement the concepts of functions	2	3
C109.4	Implement the concepts of Arrays and Strings	2	3
C109.5	Implement the concepts of Pointers & Structures	2	3
C109.6	Demonstrate the use of Files	2	3

<b>I Year II Semester</b>		
<b>Course Title: English-II</b>		<b>Course Code: R161201</b>
<b>CO No</b>	<b>CO Statement</b>	<b>POs</b>
		<b>PO10</b>
C110.1	Define education as the greatest resource, model APJ Abdul Kalam as great scientist and utilize grammar in communication.	3
C110.2	Classify different pros and cons of science, label CV Raman biography as great inspiration.	3
C110.3	Out-line and organize cultural issues well, find Homi J Babha is finest scientist and develop good attitude and self-management.	3
C110.4	Compare one culture with other culture and their pros and cons, know how and why one should set a goal.	3
C110.5	Interpret health threats of climate changes and infer PC Ray life history as a model.	3
C110.6	Choose and compare Bill Gates as chief software architect and build team work.	3

<b>Course code: R161203</b>		<b>Course Title: Mathematics – III</b>
<b>CO No</b>	<b>CO Statement</b>	<b>POs</b>
		<b>PO1</b>
C111.1	Determine rank, Matrix inverse solve linear systems and simultaneous equations	3
C111.2	Use the characteristic polynomial to compute the Eigen values and Eigen vectors of a square matrix and use them to diagonals matrices	3
C111.3	Tracing curves in Cartesian and polar form. Determine double integral a region and triple integral over a volume	3
C111.4	Evaluate improper integrals using beta and Gamma functions	3
C111.5	Calculate the gradient of a scalar function divergence and curl of a vector function	3
C111.6	Determine line, surface & volume integrals. Apply Greens, Gauss, Stokes theorems to calculate line, surface and volume integrals.	3

<b>Course code: R161211</b>		<b>Course Title: Applied Chemistry</b>
<b>CO No</b>	<b>CO Statement</b>	<b>POs</b>
		<b>PO1</b>
C112.1	Identify the advantages and limitations of plastic material and their use in design	3
C112.2	Determine the calorific value of fuels, perform flue gas analysis and combustion analysis	3
C112.3	Understand the reasons for corrosion and some methods corrosion control and applications of the reaction mechanisms of batteries and fuel cells	3
C112.4	Design the materials like nano materials fullerenes, super conductors and liquid crystals	3
C112.5	Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.	3

C112.6	Demonstrate the existing future upcoming devices, materials and methodology	3
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Course Title: Object Oriented Programming through C++		Course code: R161215
CO No	CO Statement	POs
		PO1
C113.1	Summarize the oops concepts in C++	3
C113.2	Describe the basic concepts of classes and objects	3
C113.3	Develop programs using operating overloading and inheritance	3
C113.4	Create the programs on dynamic polymorphism in C++	3
C113.5	Design the programs on templates and exceptions	3
C113.6	Outline the features of STL	3

Course Title: Environmental Studies		Course code: R161212
CO No	CO Statement	POs
		PO1
C114.1	Identify the natural resources and their importance for the sustenance of life and recognize the need to conserve the natural resources. Understand the concept of ecosystem its function in the environment and the need for protecting the producers, consumers in various ecosystems and their role in food web.	1
C114.2	Understanding the biodiversity of India and the threats to biodiversity and conservation practices to protect the biodiversity.	1
C114.3	Identify various attributes of pollution and their impacts and the measures to reduce or control the pollution with waste management.	1
C114.4	Understanding the social issues of the Environmental legislations of India and the first global initiatives towards sustainable Development.	1
C114.5	Understanding about Environmental Assessment and the stages involves in EIA and Environmental Audit.	1
C114.6	Understanding self-sustaining green campus with environmentally friendly aspects of Energy, water and waste water reuse plantation, rain water harvesting and parking curriculum.	1

Course code: R161216		Course Title: Engineering Mechanics		
CO No	CO Statement	POs		
		PO1	PO2	PO4
C115.1	Analyse an engineering problem using free body diagram concepts & will have the ability to solve for the resultants of any force systems and solve the mechanics problems associated with friction forces	3	2	2
C115.2	Apply the static equilibrium conditions in the analysis of structures.	3	2	2
C115.3	Gain knowledge on the centroid and centre of gravity of complex rigid bodies	3	2	2
C115.4	Gain knowledge on the moment of inertia of complex rigid bodies	3	2	2
C1155	Describe the motion of a particle in terms of its position, velocity and acceleration in different frames of reference and can analyse the forces causing the motion of a particle.	3	2	2

C115.6	Apply work, energy, impulse and momentum relationships and can solve problems for a particle in motion.	3	2	2
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Course code: R161227		Course Title: Applied / Engineering Chemistry Laboratory	
CO No	CO Statement	POs	
		PO1	PO4
C116.1	Estimate of Vitamin-C	2	3
C116.2	Determine the cell constant and conductance of solutions	2	3
C116.3	To Prepare advanced polymer materials	2	3
C116.4	Calculate the hardness of water	2	3
C116.5	Determine the functioning of the instruments such as pH and Potentiometric meters	2	3
C116.6	Develop to gain technical Knowledge of measuring, operating and testing of chemical instruments	2	3

Course code: R161221		Course Title: English - Communication Skills Lab – 2	
CO No	CO Statement	POs	
		PO1	PO 10
C117.1	Improved communicative competence that include clarity and confidence which in turn enhances their employability skills and ability to communicate in formal and informal situations	2	3
C117.2	To cultivate communicative Competence	2	3
C117.3	To make them ready for Industry	2	3
C117.4	Choose and apply knowledge to participate in group discussion and debating.	2	3
C117.5	Develop communication and presentations skills	2	3
C117.6	Demonstrate appropriate skills and experience in interviews, e-mail, CV writing.	2	3

Course code: R161229		Course Title: Object Oriented Programming Lab	
CO No	CO Statement	POs	
		PO1	PO4
C118.1	Execute the programs using expressions & control statements	2	3
C118.2	Demonstrate the usage of Memory allocation functions, storage classes and functions	2	3
C118.3	Implement the concepts of class, objects	2	3
C118.4	Implement the concepts of Inheritance, Polymorphism.	2	3
C118.5	Demonstrate the use of virtual functions & error handling mechanisms	2	3
C118.6	Implement generic programming and templates	2	3



Course code: R1621051		Course Title: Statistics with R Programming
CO No	CO Statement	POs
		PO1
C201.1	Explain the features of advanced data structures	2
C201.2	Summarise the basics of r-programming	2
C201.3	Apply r- programming on statically data	2
C201.4	Create graphs using r-programming	2
C201.5	Solve the problems on probability distribution	2
C201.6	Solve problems on multiple regression	2

Course code: R1621052		Course Title: Mathematical Foundations of Computer Science
CO No	CO Statement	POs
		PO1
C202.1	Solve the problems using predicate logic and predicate calculus	3
C202.2	Evaluate the problems in set theory and functions	3
C202.3	Evaluate the problems on group theory and number theory	3
C202.4	Determine permutations and combinations on data	3
C202.5	Solve the various types of recurrence relation	3
C202.6	Explain the features of graphs	3

Course code: R1621053		Course Title: Digital Logic Design
CO No	CO Statement	POs
		PO1
C203.1	Define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.	3
C203.2	Analyse the different switching algebra theorems and apply them for logic functions.	3
C203.3	Design the K-Map for a few variables and perform the reduction of logic function.	3
C203.4	Design the combinational logic circuits for logic functions and define the HDL models of Combinational circuits.	3
C203.5	Analyse the clocked sequential circuits.	3
C203.6	Design the registers and counters.	3

Course code: R1621054		Course Title: Python Programming
CO No	CO Statement	POs
		PO1
C204.1	Summarize the basics of python and scripting languages	3
C204.2	Design the python programs using basic concepts	3
C204.3	Develop programs using data structures	3

C204.4	Create the programs using packages and functions in python	3
C204.5	Apply object oriented principles in python	3
C204.6	Build Test cases using python	3

Course code: R1621055		Course Title: Data Structures through C++
CO No	CO Statement	POs
		PO1
C205.1	Summarize the oops concepts and the application of arrays	3
C205.2	Apply templates in implementation and application of stacks	3
C205.3	Develop programs using linked lists and dictionaries	3
C205.4	Design programs on various tree data structures	3
C205.5	Apply graph concepts on various algorithms	3
C205.6	Apply various searching and sorting techniques on given data.	3

Course code: R1621056		Course Title: Computer Graphics
CO No	CO Statement	POs
		PO1
C206.1	Design and implement 2D primitives graphical structures	2
C206.2	Create 3D graphical structure	2
C206.3	Build graphics program using colour model	2
C206.4	Apply different shading techniques on given objects	2
C206.5	Develop various curve generating algorithms	2
C206.6	Apply different Boolean operations on surface using ray tracing method.	2

Course code: R1621057		Course Title: Data Structures through C++Lab	
CO No	CO Statement	POs	
		PO1	PO4
C207.1	Implement various types of linked list data structures	2	3
C207.2	Implement stack and queue data structure	2	3
C207.3	Implement hash table and tree data structures	2	3
C207.4	Demonstrate DFS and BFS algorithms on Graphs	2	3
C207.5	Implement Graph algorithms	2	3
C207.6	Implement merge sort and quick sort algorithms	2	3

Course code: R1621057		Course Title: Data Structures through C++Lab
CO No	CO Statement	POs
		PO1
C208.1	Design Programs on basic concepts of Python	2
C208.2	Make use of Control Structures in Python Programming	2
C208.3	Create Programs using Functions and Files	2
C208.4	Build the Programs using OOPs principles	2

C208.5	Develop programs on GUI	2
C208.6	Create Programs on advanced concepts in Python	2

**Course code: R1622051**

**Course Title: Software Engineering**

CO No	CO Statement	POs			
		PO1	PO2	PO3	PSO1
C209.1	Demonstrate fundamental of software engineering and various process models	2	2	1	1
C209.2	Summarize the formation of SRS document and Software design process	2	2	1	1
C209.3	Illustrate the process of function oriented software design and user interface design	2	2	1	1
C4209.4	Apply coding and testing in software project	2	2	1	1
C209.5	Explain the software quality process	2	2	1	1
C209.6	Outline the software maintenance and reuse	2	2	1	1

**Course code: R1622052**

**Course Title: Java Programming**

CO No	CO Statement	POs
		PO1
C210.1	Summarize the basic concepts of java	2
C210.2	Illustrate the concepts of classes and objects	2
C210.3	Explain the concepts of inheritance , packages and exceptions	2
C210.4	Design the programs on multi-threading	2
C210.5	Develop the programs on Applets	2
C210.6	Apply GUI components in Applets	2

**Course code: R1622053**

**Course Title: Advanced Data Structures**

CO No	CO Statement	POs	
		PO2	PO3
C211.1	Design and implement external sorting and merging on given data	2	1
C211.2	Develop various hashing techniques on given data	2	1
C211.3	Explain various priority queues and heaps	2	1
C211.4	Apply various algorithms on efficient binary search trees	2	1
C211.5	Apply various algorithms on efficient multi-way search trees	2	1
C211.6	Develop various algorithms on digital search strictures	2	1

**Course code: R1622054**

**Course Title: Computer Organization**

CO No	CO Statement	POs
		PO1
C212.1	Summarise basic structure of computers	3
C212.2	Difference ate various instructions and addressing modes	3

C212.3	Identify various types of instructions	3
C212.4	Outline various input output organization in computer	3
C212.5	Demonstrate various memories in computer	3
C212.6	Explain control unit organization in CPU	3

**Course code: R1622055**

**Course Title: Formal Languages and Automata Theory**

CO No	CO Statement	POs
		PO1
C213.1	Solve various problems on NFA and DFA	3
C213.2	Evaluate regular expressions, regular grammar and conversion of RE and FA	3
C213.3	Apply derivations and normal forms on context free grammar	3
C213.4	Construct push down automata per given language	3
C213.5	Construct Turing machine by using various languages	3
C213.6	Identify various classes of problems in Turing machine	3

**Course code: R1622056**

**Course Title: Principles of Programming Languages**

CO No	CO Statement	POs
		PO1
C214.1	Summarize the syntax and semantics of programming languages	3
C214.2	Demonstrate data types and basic statements of programming languages	3
C214.3	Illustrate subprograms and implementations of programming languages	3
C214.4	Apply object orientation and event handling on programming languages	3
C214.5	Outline the features of functional programming languages	3
C214.6	Explain the features of logical programming languages	3

**Course code: R1622057**

**Course Title: Advanced Data Structures Lab**

CO No	CO Statement	POs
		PO4
C215.1	Implement heap and various tree structure like AVL, Red-black, B and Segment trees	3
C215.2	Develop programs for sorting	3
C215.3	Develop programs for implementing trees and their traversal operations	3
C215.4	Implement graph traversal algorithms	3
C215.5	Apply B tree algorithm design techniques	3
C215.6	Solve the problems such as line segment intersection, convex shell and Voronoi diagram	3

**Course code: R1622058**

**Course Title: Java Programming Lab**

CO No	CO Statement	POs
		PO4
C216.1	Determine class, objects, methods, inheritance	3
C216.2	Apply OOP in problem solving and writing basic programs.	3
C216.3	Implement code for data structures and sorting techniques	3
C216.4	Apply multithreaded concept for parallel programming	3

C216.5	Implement program with exceptional handling	3
C216.6	Create GUI based applications using swings and applets	3

**Course code: R1631051**

**Course Title: Compiler Design**

CO No	CO Statement	POs	
		PO1	PO2
C301.1	Summarise the process of compilation	3	2
C301.2	Develop various top down parsers for given CFG	3	2
C301.3	Build various types of bottom up parsers for given CFG	3	2
C301.4	Illustrate the process of semantic analysis	3	2
C301.5	Explain various implementations of symbol tables and the role of code generation phase in compiler design	3	2
C301.6	Outline various code optimisation techniques.	3	2

**Course code: R1631052**

**Course Title: UNIX Programming**

CO No	CO Statement	POs
		PO5
C302.1	Summarize the features of various utilities of the Unix	1
C302.2	Describe the features of the Unix file system	1
C302.3	Develop the programs using shell script	1
C302.4	Illustrate the features of filters	1
C302.5	Outline the basic characteristics of shell script	1
C302.6	Design the programs on process management	1

**Course code: R1631053**

**Course Title: Object Oriented Analysis and Design using UML**

CO No	CO Statement	POs			
		PO1	PO2	PO3	PO4
C303.1	Develop the complex systems for modelling	2	2	3	2
C303.2	Demonstrate the relation-ship between classes and objects.	2	2	3	2
C303.3	Summarize the basic concepts of UML.	2	2	3	2
C303.4	Design behavioural diagrams of the projects.	2	2	3	2
C303.5	Construct advanced behavioural diagrams for projects.	2	2	3	2
C303.6	Apply UML diagrams on real time applications.	2	2	3	2

**Course code: R1631054**

**Course Title: Database Management Systems**

CO No	CO Statement	POs
		PO1
C304.1	Summarise the fundamentals and architecture of DBMS	3
C304.2	Design ER models for real time applications	3
C304.3	Apply SQL Queries, Triggers and cursors on active database	3
C304.4	Apply various normal forms on databases	3
C304.5	Apply Transaction management and concurrency control on databases	3
C304.6	Analyse the storage and indexing in databases	3

**Course code: R1631055**

**Course Title: Operating Systems**

CO No	CO Statement	POs		
		PO1	PO2	PO3
C305.1	Summarise the basic concepts of operating systems	3	3	1
C305.2	Apply various scheduling algorithms on process	3	3	1
C305.3	Illustrate memory management and apply page replacement algorithms in memory	3	3	1
C305.4	Explain the principles of concurrency and apply the principles of deadlocks on process and resources	3	3	1
C305.5	Explain the file system implementation and its interface	3	3	1
C305.6	Outline the features of LINUX and ANDROID	3	3	1

**Course code: R1631056**

**Course Title: Unified Modeling Lab**

CO No	CO Statement	POs
		PO4
C306.1	Demonstrate the Rational Rose Tool	3
C306.2	Construct Use case view for real time applications	3
C306.3	Construct Design view for real time applications	3
C306.4	Design implementation view for real time applications	3
C306.5	Design process view for real time applications	3
C306.6	Develop architectural view for real time applications	3

**Course code: R1631057**

**Course Title: Operating System & Linux Programming Lab**

CO No	CO Statement	POs	
		PO3	PO4
C307.1	Describe the basic utilities of Linux.	1	3
C307.2	Design the programs to stimulate file utilities using C.	1	3
C307.3	Describe the important computer system resources and the role of operating system in their management policies and algorithms.	1	3
C307.4	Evaluate the requirement for process synchronization and coordination handled by operating system	1	3
C307.5	Describe and Analyze the memory management and its allocation policies	1	3
C307.6	Identify the need to create the special purpose operating system	1	3

**Course code: R1631058**

**Course Title: Database Management System Lab**

CO No	CO Statement	POs	
		PO1	PO4
C308.1	Understand, appreciate and effectively explain the underlying concepts of database technologies	2	3
C308.2	Design and implement a database schema for a given problem-domain	2	3

C308.3	Populate and query a database using SQL DML/DDDL commands	2	3
C308.4	Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS	2	3
C308.5	Understand the role of PL/SQL block and implementation.	2	3
C308.6	Programming PL/SQL including stored procedures, stored functions, cursors, packages	2	3

**Course code: R1632051**

**Course Title: Computer Networks**

CO No	CO Statement	POs	
		PO3	PO5
C309.1	Compare and contrast between OSI and TCP reference models	1	1
C309.2	Interpret the features and issues present in Physical and Data link layer	1	1
C309.3	Apply Error control and Flow control on given data format	1	1
C309.4	Analyse the features of MAC layer	1	1
C309.5	Apply various routing algorithms in Network layer to route the packet	1	1
C309.6	Explain the features of Application and Transport layer	1	1

**Course code: R1632052**

**Course Title: Data Warehousing and Mining**

CO No	CO Statement	POs	
		PO1	PO2
C310.1	Summarise the basic concepts of data mining	2	2
C310.2	Explain the process of pre-processing the data	2	2
C310.3	Describe the process of building data warehouse	2	2
C310.4	Apply classification techniques on data source	2	2
C310.5	illustrate the alternative classification techniques on data	2	2
C310.6	apply clustering algorithms on given data	2	2

**Course code: R1632053**

**Course Title: Design and Analysis of Algorithms**

CO No	CO Statement	POs
		PO1
C311.1	Evaluate Time complexity and space complexity of various algorithm	1
C311.2	Design and evaluate various divide and conquer algorithms	1
C311.3	Develop analyse various greedy methods algorithms	1
C311.4	Create and analyse various dynamic programming algorithms	1
C311.5	Analyse different back tracking algorithms	1
C311.6	Analyse different branch and bound algorithms	1

**Course code: R1632054**

**Course Title: Software Testing Methodologies**

CO No	CO Statement	POs			
		PO2	PO3	PO5	PSO1
C312.1	Illustrate the purpose of testing and path testing	2	1	1	2
C312.2	Understand the Basics of testing	2	1	1	2
C312.3	Demonstrate Domain testing and path testing	2	1	1	2
C312.4	Adopt syntax and logic based testing techniques	2	1	1	2

C312.5	Summarize state graphs and transition testing	2	1	1	2
C312.6	Apply automated software testing tools to execute test cases	2	1	1	2

**Course code: R1632056**

**Course Title: Network Programming Lab**

CO No	CO Statement	POs	
		PO4	PO5
C313.1	Understand the basic commands in networks and elementary socket system calls	3	1
C313.2	Implement the connection oriented and connectionless service	3	1
C313.3	Implement socket system calls	3	1
C313.4	Implement some routing algorithms	3	1
C313.5	Implement some transfer protocols	3	1
C313.6	Implement the cryptographic algorithms	3	1

**Course code: R1632057**

**Course Title: Software Testing Lab**

CO No	CO Statement	POs	
		PO4	PO5
C314.1	Illustrate the purpose of testing and path testing	3	2
C314.2	Understand the Basics of testing	3	2
C314.3	demonstrate Domain testing and path testing	3	2
C314.4	Able to adopt syntax and logic based testing techniques	3	2
C314.5	Summarize state graphs and transition testing	3	2
C314.6	Able to apply automated software testing tools to execute test cases	3	2

**Course code: R1632058**

**Course Title: Data Warehousing and Mining Lab**

CO No	CO Statement	POs	
		PO2	PO4
C315.1	Attain knowledge on using Weka tool in solving problems	2	3
C315.2	Examine and analyze alternative solutions to a problem.	2	3
C315.3	Design an algorithmic solution to a problem using problem decomposition and step-wise refinement.	2	3
C315.4	Demonstrate association of data	2	3
C315.5	Implement the classification of data	2	3
C315.6	Implement the concept of clustering of data.	2	3



**Course code: R1641051**

**Course Title: Cryptography and Network Security**

CO No	CO Statement	POs		
		PO1	PO2	PO3
C401.1	Explain the basic principles of information security	2	2	1
C401.2	Apply symmetric encryption techniques on information	2	2	1
C401.3	Apply Asymmetric encryption techniques on information	2	2	1
C401.4	Apply data integrity, digital signature, on messages	2	2	1
C401.5	Explain the features of PGP SMIME	2	2	1
C401.6	Illustrate the features of ip security	2	2	1

**Course code: R1641052**

**Course Title: Software Architecture & Design Patterns**

CO No	CO Statement	POs		
		PO2	PO3	PSO1
C402.1	Explain various features of software architecture	2	1	2
C402.2	Analyse the software architectures	2	1	2
C402.3	Outline the features of design patterns	2	1	2
C402.4	Illustrate the features of structural patterns	2	1	2
C402.5	Summarise the features of behavioural patterns	2	1	2
C402.6	Apply design patterns on web applications and document editor	2	1	2

**Course code: R1641053**

**Course Title: Web Technologies**

CO No	CO Statement	POs		
		PO1	PO2	PO3
C403.1	Create web pages using HTML and CSS	2	2	2
C403.2	Design programs to validate HTML pages using java script	2	2	2
C403.3	Demonstrate the features of DOM and SAX	2	2	2
C403.4	Develop programs using PHP	2	2	2
C403.5	Develop programs on Ruby basics	2	2	2
C403.6	Design programs on Ruby	2	2	2

**Course code: R1641054**

**Course Title: Managerial Economics and Financial Analysis**

CO No	CO Statement	POs
		PO11
C404.1	Understand nature of managerial economics and analyse demand and supply concept	3
C404.2	Apply break even analysis on productions	3
C404.3	Familiarise with different marketing strategies on prices	3
C404.4	Explain business and phases of business life cycle	3
C404.5	Apply different technical accounting statements to various rating	3
C404.6	Explain budgets and its applications	3

**Course code: R1641057**

**Course Title: Software Architecture& Design Patterns Lab**

CO No	CO Statement	POs
		PO4
C405.1	Understand the Rational Rose Tool & CORBA-IDL	3
C405.2	Implement the Use case view & Logical view for Real Time Applications	3
C405.3	Apply software architecture principles on Real time applications.	3
C405.4	Develop design solutions using creational patterns.	3
C405.5	Construct design solutions by using structural patterns.	3
C405.6	Construct design solutions by using behavioural patterns.	3

**Course code: R1641058**

**Course Title: Web Technologies Lab**

CO No	CO Statement	POs
		PO4
C406.1	Design a static website using HTML	3
C406.2	Develop JavaScript for validations	3
C406.3	Prepare and use XML to store and forwarding data.	3
C406.4	Design dynamic websites using PHP and AJAX	3
C406.5	Create Web applications by using PHP with Database Connectivity.	3
C406.6	Develop programs using Perl and Ruby	3

**Course code: R1642051**

**Course Title: Distributed Systems**

CO No	CO Statement	POs
		PO2
C407.1	Summarise the characteristics of distributed systems	2
C407.2	Outline the features of inter process communication in DS	2
C407.3	Apply Distributed objects and remote invocation in java RMI	2
C407.4	Explain the operating system support for DS	2
C407.5	Illustrate the features of distributed file system	2
C407.6	Explain the role of Transaction and replications in DS	2

**Course code: R1642052**

**Course Title: Management Science**

CO No	CO Statement	POs
		PO11
C408.1	Understand nature of managerial economics and analyse demand and supply concept	3
C408.2	Apply break even analysis on productions	3
C408.3	Familiarise with different marketing strategies on prices	3
C408.4	Explain business and phases of business life cycle	3
C408.5	Apply different technical accounting statements to various rating	3
C408.6	Explain budgets and its applications	3

**Course code: R1642053**

**Course Title: Machine Learning**

CO No	CO Statement	POs	
		PO1	PO2
C409.1	Explain the role of machine learning in real time applications	1	3
C409.2	Illustrate the problems in machine learning	1	3
C409.3	Various machine learning algorithms	1	3
C409.4	Apply machine learning algorithms on data	1	3
C409.5	Apply machine learning algorithms on vector machines	1	3
C409.6	Apply machine learning algorithms on data regression	1	3

**Course code: R1642055**

**Course Title: Seminar**

CO No	CO Statement	POs
		PO10
C410.1	Deliver technical content on a specific topic to a group of audience	2
C410.2	Communicate in English with a group of peers	2
C410.3	Prepare and present a technical content using appropriate tool	2
C410.4	Respond to the queries posted by the audience during the presentation	2
C410.5	Exhibit the questioning skills in a presentation	2
C410.6	Deliver technical content on a specific topic to a group of audience	2

**Course code: R1642056**

**Course Title: Project**

CO No	CO Statement	POs												PSOs	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C411.1	Demonstrate a depth of knowledge of Computer Science Engg	1	1	1	2	1	1	1	1	1	2	1	1	2	2
C411.2	Complete a thesis on research topic	1	1	1	2	1	1	1	1	1	2	1	1	2	2
C411.3	Demonstrate knowledge of contemporary issues in their chosen field of research.	1	1	1	2	1	1	1	1	1	2	1	1	2	2
C411.4	Demonstrate an ability to present and defend their research work to a panel of experts.	1	1	1	2	1	1	1	1	1	2	1	1	2	2
C411.5	show team work in completing project outcomes and documentation	1	1	1	2	1	1	1	1	1	2	1	1	2	2
C411.6	Demonstrate interdiscipline team work	1	1	1	2	1	1	1	1	1	2	1	1	2	2

**Department of Mechanical Engineering**

**Curriculum under Academic Regulation 2016 of JNTUK Kakinada**

**Course Title: English-I**

**Course code:R161101**

CO No	CO Statement	POs
		PO10
C101.1	Develop their knowledge different fields and serve the society accordingly and acquire writing skills	3
C101.2	Motivates the public to adopt road safety measures and acquire writings skills	3
C101.3	Create an awareness in the readers that mass production is ultimately detrimental to biological survival and acquire writing skills	3
C101.4	Choose a source of energy suitable for rural India and writing skills	3
C101.5	Highlight the fact that animals must be preserved because animal life is precious and acquire writings skills	3
C101.6	Identifying safety measures against different of accidents at home and in the workplace and acquire writings skills	3

**Course Title: Mathematics – I**

**Course code: R161102**

CO No	CO Statement	POs
		PO1
C102.1	Solve linear differential equations first order	3
C102.2	Solve analytically a wide range of higher order differential equations with constant coefficients	3
C102.3	Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE	3
C102.4	Calculate the total derivative, Jacobian and extreme values of a function of two variables	3
C102.5	Solve problems related to basic linear and non - linear equations	3
C102.6	Solve higher order partially differential equations with constant coefficients and classify second order PDE	3

**Course Title: Engineering Chemistry**

**Course code: R161105**

CO No	CO Statement	POs
		PO1
C103.1	Outline the properties of polymers and various additives added and different methods of forming plastic materials	3
C103.2	Define various fuels and their occurrences, synthesis and purifications	3
C103.3	Explain the theory of construction of battery and fuel cells and the reasons for corrosion and study some methods of corrosion control	3
C103.4	Identify the synthesising Nano materials and their application in Industry	3
C103.5	Develop the methods to produce soft water for Industrial use and potable water at cheaper cost	3
C103.6	Design sources of energy by different Natural sources	3

**Course Title: Computer Programming**

**Course code: R161107**

CO No	CO Statement	POs	
		PO1	PO4
C104.1	Summarize the basics concepts of computers	3	1
C104.2	Describe the basic concepts of C	3	1
C104.3	Develop programs using control structures	3	1
C104.4	Create the programs using functions in C	3	1
C104.5	Explain the concepts of arrays and strings	3	1
C104.6	Build C programs using files and dynamic memory allocation	3	1

**Course Title: Environmental Studies**

**Course code: R161107**

CO No	CO Statement	POs	
		PO1	PO4
C105.1	Outline the natural resources and their importance for the sustain of life and recognize the need to conserve the natural resources concept of ecosystem its function in the environment and the need for protecting the producers, consumers in various ecosystems and their role in food web.	1	2
C105.2	Explain the biodiversity of India and the threats to biodiversity and conservation practices to protect the biodiversity.	1	2
C105.3	Identify various attributes of pollution and their impacts and the measures to reduce or control the pollution with waste management.	1	2
C105.4	Illustrate the social issues of the Environmental legislations of India and the first global initiatives towards sustainable Development.	1	2
C105.5	Design the Environmental Assessment and the stages involves in EIA and Environmental Audit.	1	2
C105.6	Create self-sustaining green campus with environmentally friendly aspects of Energy, water and waste water reuse plantation, rain water harvesting and parking curriculum.	1	2

**Course Title: Engineering Mechanics**

**Course code: R161111**

CO No	CO Statement	POs		
		PO1	PO5	PO10
C106.1	Compare different systems of forces and about moment of forces and analyze the friction and apply its practical application	3	2	1
C106.2	Label free body diagrams. Make use of solution to problems using graphical methods and law of triangular forces and examine equilibrium conditions	3	2	1
C106.3	Determine centroidal and centre of gravity for different shaped figures/bodies and develop the same for built-up sections	3	2	1
C106.4	Apply moment of inertia and construct polar moment of Inertia and compare for different sections and solve their applications	3	2	1
C106.5	Choose the motion in straight line and classify curvilinear paths, compare its velocity and acceleration and develop methods of representing plane motion	3	2	1
C106.6	Recall concepts of work, energy and particle motion and analyze and adapt with real life examples	3	2	1

**Course Title: English Communication Skills Lab-I**

**Course code:R161114**

CO No	CO Statement	POs
		PO10
C107.1	Apply different language functions and phrases at different situations to communicate with people.	3
C107.2	Translate English phonemes into graphemes and graphemes into phonemes.	3
C107.3	Build confidence and develop communication skills with proper pronunciation.	3
C107.4	Able to communicate in formal and informal situations.	3
C107.5	To Cultivate communicative Competence.	3
C107.6	To make them ready for Industry.	3

**Course Title: Engineering Chemistry**

**Course code:R161118**

CO No	CO Statement	POs	
		PO1	PO4
C108.1	Identify the professional course have practically very little exposure to the lab classes	2	3
C108.2	Demonstrate the experiments of introduce to the volumetric analysis	2	3
C108.3	An ability to gain technical Knowledge of measuring ,operating and testing of chemical instruments and equipment	2	3
C108.4	Calculate the hardness of water	2	3
C108.5	Determine the functioning of the pH instruments	2	3
C108.6	Determine the functioning of the Potentiometric meters	2	3

**Course Title: Computer Programming Lab**

**Course code:R161119**

CO No	CO Statement	POs	
		PO1	PO4
C109.1	Execute programs in Linux environment	2	3
C109.2	Demonstrate the usage of basic concepts includes variables, operators & control statements	2	3
C109.3	Implement the concepts of functions	2	3
C109.4	Implement the concepts of Arrays and Strings	2	3
C109.5	Implement the concepts of Pointers & Structures	2	3
C109.6	Demonstrate the use of Files	2	3

**Course Title: English – II**

**Course code: R161201**

CO No	CO Statement	POs
		PO10
C110.1	Lesson Underscores that the ultimate aim of education is to enhance wisdom and Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps	3
C110.2	Enables the students to promote peaceful co-existence and universal harmony among people and society and achievements of C V Raman are inspiring and exemplary to the readers and all scientists	3

C110.3	Manage different cultural shocks due to globalization and the seminal contributions of Homi Jehangir Bhaba to Indian nuclear programme provide an aspiration to the readers to serve the nation and strengthen it.	3
C110.4	Project society's need to re-examine its traditions when they are out dated and the scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.	3
C110.5	Protect environment for the sustainability of the future generations and Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader	3
C110.6	Get inspired by eminent personalities who toiled for the present day advancement of software development and the lesson about Srinivasa Ramanujan provides inspiration to the readers to think and tap their innate talents	3

**Course Title: Mathematics -II**

**Course code: R161202**

CO No	CO Statement	POs
		PO1
C111.1	Calculate a root of algebraic and transcendental equations. Explain relation between the finite Difference operators	3
C111.2	Compute interpolating polynomials for the given data.	3
C111.3	Solve ordinary differential equations numerically using Euler's and RK method	3
C111.4	Find Fourier series for certain functions	3
C111.5	Identify/classify and solve the different types of partial differential equations	3
C111.6	Find Fourier Transforms and Finite Fourier transforms for certain functions	3

**Course Title: Mathematics -III**

**Course code: R161203**

CO No	CO Statement	POs
		PO1
C112.1	Determine rank, Matrix inverse solve linear systems and simultaneous equations	3
C112.2	Use the characteristic polynomial to compute the eigen values and eigen vectors of a square matrix and use them to diagonal matrices	3
C112.3	Tracing curves in Cartesian and polar form. Determine double integral a region and triple integral over a volume	3
C112.4	To evaluate improper integrals using beta and gamma functions	3
C112.5	Calculate the gradient of a scalar function, divergence and curl of a vector function	3
C112.6	Determine line, surface and volume integrals. Apply Greens, Gauss, Stokes theorems to calculate line, surface and volume integrals	3

**Course Title: Engineering Physics**

**Course code: R161204**

CO No	CO Statement	POs
		PO1
C113.1	Illustrate the principles of interference of light	3
C113.2	Demonstrate the diffraction of light	3
C113.3	Apply the concepts of light for optical communication	3
C113.4	Summarize the Principles and Propagation of EM Waves	3
C113.5	Apply Quantum mechanics to study the behaviour of a particles	3

C113.6	Identify the appropriate solid state materials for engineering applications	3
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**Course Title: Basic Electrical and Electronics Engineering**

**Course code:R161209**

CO No	CO Statement	POs	
		PO1	PO4
C114.1	Illustrate the basic concepts of basic magnetic circuits, and electrostatics	1	1
C114.2	Analyse AC and DC circuits	1	1
C114.3	Illustrate the basic principles and applications of AC and DC Machines	1	1
C114.4	Illustrate the basic principles and applications of Alternators and Induction motors	1	1
C114.5	Illustrate the basic concepts of Diodes	1	1
C114.6	Illustrate the basic concepts of transistors	1	1

**Course Title: Engineering Drawing**

**Course code: R161221**

CO No	CO Statement	POs		
		PO1	PO5	PO10
C115.1	Draw regular polygons and engineering curves by different methods using drawing instruments and Employ scales to represent engineering data	3	3	3
C115.2	Apply the principle of orthographic projection in projecting points and lines in simple positions	3	3	3
C115.3	Construct projection of straight lines in inclined positions and use the fundamental principles in the determination of true length, angles of inclinations and locating traces	3	3	3
C115.4	Apply the basic principles to draw projections of regular planes in simple and inclined positions	3	3	3
C115.5	Draw the projection of various types of solids in different simple position including inclination to one of the planes	3	3	3
C115.6	Distinguish orthographic and isometric views and represent the isometric views of an object and convert orthographic views to isometric views and vice- versa	3	3	3

**Course Title: English Communication Skills Lab-II**

**Course code:R161221**

CO No	CO Statement	POs
		PO10
C116.1	Become successful in the competitive world	3
C116.2	Develop communication and presentations skills	3
C116.3	Demonstrate appropriate skills and experience in interviews,e-mail, CV writing	3
C116.4	Able to communicate in formal and informal situations	3
C116.5	To Cultivate communicative Competence	3
C116.6	To make them ready for Industry	3

**Course Title: Engineering Physics Lab**

**Course code:R161222**

CO No	CO Statement	POs	
		PO1	PO4
C117.1	Determine the relevant Physical Quantities form experimental measurements	3	1
C117.2	Apply the principles and concepts using devices and compare results with	3	1



	theoretical calculations		
C117.3	Make use of graphical analysis to the experimental data for estimation of physical quantities	3	1
C117.4	Distinguish the characteristics of materials in a practical manner and gain knowledge of its usage	3	1
C117.5	Develop the laboratory skills in handling of electrical and optical instruments	3	1
C117.6	Demonstrate the interference and diffraction phenomena of light	3	1

**Course Title: Engineering Physics- Virtual Las-assignments**

**Course code:R161223**

CO No	CO Statement	POs	
		PO1	PO4
C118.1	Determine the relevant Physical Quantities from experimental measurements	3	1
C118.2	Apply the principles and concepts using devices and compare results with theoretical calculations	3	1
C118.3	Make use of graphical analysis to the experimental data for estimation of physical quantities	3	1
C118.4	Distinguish the characteristics of materials in a practical manner and gain knowledge of its usage	3	1
C118.5	Develop the laboratory skills in handling of electrical and optical instruments	3	1
C118.6	Demonstrate the interference and diffraction phenomena of light	3	1

**Course Title: Engineering Workshop**

**Course code:R161224**

CO No	CO Statement	POs	
		PO1	PO4
C119.1	Discriminate between tools of various trades such as carpentry, fitting, sheet metal, forging & house wiring.	1	1
C119.2	Practice the fitting operations such as V-Fit, Square Fit etc.	1	1
C119.3	Practice the carpentry modules such as lap, dovetail, mortise, tenon joint etc.	1	1
C119.4	Practice the various sheet metals like Funnel, Tray. etc	1	1
C119.5	Perform the blacksmith operations on mild steel	1	1
C119.6	Explain the tools & connections pertaining to house wiring, stair case wiring.	1	1

**Course Title: Metallurgy & Material Science**

**Course code:R1621031**

CO No	CO Statement	POs			
		PO1	PO4	PSO1	PSO2
C201.1	Understand bonding characteristics of metals and alloys	3	2	2	2
C201.2	Differentiate cast irons and steels in terms of properties	3	2	2	2
C201.3	Identify the influence of various elements in steel alloys on mechanical properties	3	2	2	2
C201.4	Demonstrate the influence of various alloying elements on iron-iron carbide system and various heat treatment and strengthening processes	3	2	2	2
C201.5	Use suitable non-ferrous metals and alloys for practical applications	3	2	2	2

C201.6	Compare applications of ceramic, composite and other advanced materials	3	2	2	2
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**Course Title: Mechanics of Solids**

**Course code:R1621032**

CO No	CO Statement	POs				
		PO1	PO2	PO3	PSO1	PSO2
C202.1	Outline the concepts of stresses and strains of varying cross-sectional bodies	2	3	3	2	2
C202.2	Solve the shear force and bending moment problems for beams of various supports and loads	2	3	3	2	2
C202.3	Identify shear stresses due to application of twisting moment	2	3	3	2	2
C202.4	Solve the slope and deflection for beams of various load and support arrangements	2	3	3	2	2
C202.5	Interpret the stress analysis on thin and thick cylinder shells.	2	3	3	2	2
C202.6	Understand shear stresses induced in circular shafts and apply to the columns of different end conditions	2	3	3	2	2

**Course Title: Thermodynamics**

**Course code:R1621033**

CO No	CO Statement	POs			
		PO1	PO2	PO3	PSO1
C203.1	Describe thermodynamic systems and concept of work and heat	3	3	1	2
C203.2	Apply the first of thermodynamics for various flow processes to the mechanical components	3	3	1	2
C203.3	Apply 2nd law of thermodynamics to solve the problems in refrigeration	3	3	1	2
C203.4	Understand steam formation and phase change of steam of various thermodynamic processes	3	3	1	2
C203.5	Analyse the psychometric conditions of various systems	3	3	1	2
C203.6	Calculate the efficiency of various air cycles	3	3	1	2

**Course Title: MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS Course Code: R1621034**

CO No	CO Statement	POs	
		PO2	PO11
C204.1	Analyze various demand forecasting methods.	1	3
C204.2	Analyse the cost concept for decision making & to estimate the least cost combination of inputs	1	3
C204.3	Apply price output determination under various market conditions	1	3
C204.4	Demonstrate various stages of business strategies	1	3

C204.5	Use various accounting tools for analysis	1	3
C204.6	Demonstrate various instruments for project proposals with the help of capital budgeting techniques for decision making	1	3

**Course Title: Fluid Mechanics and Hydraulic Machinery**

**Course Code: R1621035**

CO No	CO Statement	POs			
		PO1	PO2	PO3	PSO1
C205.1	Understand the concept of fluid properties and its manometric	3	3	1	2
C205.2	Understand the basic laws of fluids, flow patterns	3	3	1	2
C205.3	Explain the concepts related to boundary layer theory	3	3	1	2
C205.4	Understand the fundamental concepts of jet and jet propulsion	3	3	1	2
C205.5	Demonstrate the Characteristic curves and Governing of turbines.	3	3	1	2
C205.6	Classify the pumps based on working principle	3	3	1	2

**Course Title: Computer Aided Engineering Drawing Practice**

**Course Code: R1621036**

CO No	CO Statement	POs				
		PO1	PO5	PO10	PSO1	PSO2
C206.1	Understand the Projections of various objects, representation and dimensioning.	2	3	1	3	3
C206.2	Draw Isometric Projections of any object	2	3	1	3	3
C206.3	Draw orthographic projections of 3D objects	2	3	1	3	3
C206.4	Understand commands in Auto CAD and generating 2D objects	2	3	1	3	3
C206.5	Understand View Points and View Ports and used to different commands for 2D and 3Drawings.	2	3	1	3	3
C206.6	Modeling of Components using Geometric Modeling Techniques	2	3	1	3	3

**Course Title: Electrical & Electronics Engineering Lab**

**Course Code: R1621037**

CO No	CO Statement	POs		
		PO1	PO4	PSO1
C207.1	To estimate the efficiency and regulation for different load conditions and power factors of single phase transformer with OC and SC test.	1	1	1
C207.2	To analyse the performance characteristics and to determine efficiency of DC shunt motor & 3-phase induction motor.	1	1	1
C207.3	To pre-determine the regulation of an alternator by synchronous impedance method.	1	1	1
C207.4	To control the speed of dc shunt motor using speed control methods	1	1	1
C207.5	To find out the characteristics of PN junction diode & transistor	1	1	1

C207.6	To determine the ripple factor of half wave & full wave rectifiers.	1	1	1
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**Course Title: Mechanics of Solids & Metallurgy Lab**

**Course Code: R1621038**

CO No	CO Statement	POs			
		PO1	PO4	PSO1	PSO2
C208.1	Investigate the material properties of various materials	2	3	2	2
C208.2	Experiment the Stress strain behaviour of various materials	2	3	2	2
C208.3	Apply their knowledge on hardness evaluation of various materials.	2	3	2	2
C208.4	Identify and classify the microstructures of various materials.	2	3	2	2
C208.5	Develop the composite materials for practical applications	2	3	2	2
C208.6	Evaluate the material properties through various destructive testing procedures.	2	3	2	2

**Course Title: Kinematics of Machinery**

**Course code: R1622031**

CO No	CO Statement	POs				
		PO1	PO2	PO3	PSO 1	PSO 2
C209.1	Identify different principles and inversions of planar mechanisms.	2	2	2	3	2
C209.2	Model lower pair mechanisms	2	2	2	3	2
C209.3	Illustrate velocity and acceleration diagrams in plane motion of a body.	2	2	2	3	2
C209.4	Draw cam profiles with various motion displacement principles	2	2	2	3	2
C209.5	Build the higher pairs mechanisms	2	2	2	3	2
C209.6	Determine moment of inertia of mechanical systems	2	2	2	3	2

**Course Title: Thermal Engineering-I**

**Course code: R1622032**

CO No	CO Statement	POs				
		PO1	PO2	PO3	PSO1	PSO2
C210.1	Describe the reasons and affects of various losses that occur in the actual engine operation.	2	2	2	3	2
C210.2	Explore the importance of various engine systems along with their functions	2	2	2	3	2
C210.3	Explain the combustion phenomenon & knocking in S.I. and C.I. Engines	2	2	2	3	2
C210.4	Analyse the performance of IC Engine	2	2	2	3	2
C210.5	Determine the performance of reciprocating air compressor.	2	2	2	3	2
C210.6	Apply the concept of air compression in Rotary, Dynamic and Axial flow compressors	2	2	2	3	2

**Course Title: Production Technology**

**Course code: R1622033**

CO No	CO Statement	POs		
		PO1	PSO1	PSO2
C211.1	Design suitable patterns, Gating ,runner and riser systems	2	3	3
C211.2	Select a suitable casting process based on the component	2	3	3
C211.3	Demonstrate various arc welding processes	2	3	3
C211.4	Demonstrate solid state welding processes and modern welding processes	2	3	3
C211.5	Demonstrate metal forming processes and powder metallurgy techniques	2	3	3
C211.6	Explore various sheet metal forming and processing of plastic methods and its applications	2	3	3

**Course Title: Design of Machine Members-I**

**Course code: R1622034**

CO No	CO Statement	POs				
		PO1	PO2	PO3	PSO1	PSO2
C212.1	Calculate various types of simple stresses in the machine components	2	3	3	3	3
C212.2	Calculate dynamic stresses in the machine components subjected to bending.	2	3	3	3	3
C212.3	Design riveted, welded and bolted joints subjected to static loads	2	3	3	3	3
C212.4	Design the keys, cotters and knuckle joints, machine shafts for couplings	2	3	3	3	3
C212.5	Design and suggest suitable coupling for a given application	2	3	3	3	3
C212.6	Calculate stresses in springs subjected to static loads and dynamic loads	2	3	3	3	3

**Course Title: Machine Drawing**

**Course code: R1622035**

CO No	CO Statement	POs			
		PO1	PO10	PSO1	PSO2
C213.1	Draw the Machine Elements - Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.	1	3	3	3
C213.2	Draw the various joint- Keys, cotter joints and knuckle joint, Riveted joints for plates, Shaft coupling, spigot and socket pipe joint.	1	3	3	3
C213.3	Draw the simple mechanical parts - Journal, pivot and collar and foot step bearings.	1	3	3	3
C213.4	Draw the assembly from the individual part drawing of various engine parts – Gear pump, Fuel pump Petrol Engine connecting rod, piston assembly.	1	3	3	3
C213.5	Draw the assembly from the individual part drawing of other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.	1	3	3	3
C213.6	Draw the assembly from the individual part drawing of miscellaneous machine components - Valves: spring loaded safety valve, feed check valve and air cock, Control valves.	1	3	3	3

**Course Title: Industrial Engineering and Management**

**Course code: R1622036**

CO No	CO Statement	POs
		PO11
C214.1	Understand the basic engineering and management concepts	3
C214.2	Apply Quantitative techniques in deciding plant location and layout	3
C214.3	Design a system, component or process and synthesize solutions to achieve desired needs	3
C214.4	Describe the importance of quality control and quality management concepts	3
C214.5	Identify the areas of social concerns towards public health and safety, cultural, societal and environmental issues	3
C214.6	Implement the fundamental prospects of effective project management	3

**Course Title: Fluid Mechanics and Hydraulic Machinery Lab**

**Course code: R1622037**

CO No	CO Statement	POs		
		PO1	PO4	PSO1
C215.1	Understanding of basic physics of fluids.	1	1	2
C215.2	Gaining knowledge to calculate and design engineering applications involving fluid	1	1	2
C215.3	Having knowledge about current research topics about fluid mechanics	1	1	2
C215.4	Able to understand to analyze practical problems in all power plants and chemical industries	1	1	2
C215.5	Given the required flow rate and pressure rise, select the proper pump to optimize the pumping efficiency	1	1	2
C215.6	To provide exposure to modern computational techniques in fluid dynamics	1	1	2

**Course Title: Production Technology Lab**

**Course code: R1622038**

CO No	CO Statement	POs			
		PO1	PO4	PSO1	PSO2
C216.1	Experiment on various manufacturing methods	1	2	3	3
C216.2	Prepare the pattern using casting process	1	2	3	3
C216.3	Practice the welding processes and select a suitable process based on the application and requirements	1	2	3	3
C216.4	Apply the spot welding technique to fabricate the models	1	2	3	3
C216.5	Compare the forging technology over casting process	1	2	3	3
C216.6	Apply sheet metal forming and processing of plastic methods	1	2	3	3

**Course Title: Dynamics of Machinery**

**Course code: R1631031**

CO No	CO Statement	Pos				
		PO1	PO2	PO3	PSO1	PSO2
C301.1	Analyze the gyroscopic couple and gyroscopic effect of precession motion on the stability of sea vehicles, aircrafts and automobile vehicles	2	3	2	3	2
C301.2	Compute frictional losses, torque transmission of mechanical systems of screw jack, clutches, breaks and dynamometers and its types	2	3	2	3	2
C301.3	Enumerate dynamic force analysis of slider crank mechanism and design of flywheel	2	3	2	3	2
C301.4	Explain concept on governors and types of governors with auxiliary springs, Sensitiveness, isochronisms and hunting	2	3	2	3	2
C301.5	Develop knowledge of analytical and graphical methods for calculating balancing of rotary and reciprocating masses.	2	3	2	3	2
C301.6	Apply knowledge of vibrations and find out the methods to calculate the natural frequencies of different vibration systems	2	3	2	3	2

**Course Title: Metal Cutting & Machine Tools**

**Course code: R1631032**

CO No	CO Statement	POs			
		PO1	PO4	PSO1	PSO2
C302.1	Develop metal cutting processes by using geometry of cutting tools	2	1	3	3
C302.2	Explain the working principles of Lathe and Milling machines	2	1	3	3
C302.3	Demonstrate various operations on turning machines	2	1	3	3
C302.4	Demonstrate various operations on surface machining machines	2	1	3	3
C302.5	Demonstrate surface finishing operations	2	1	3	3
C302.6	Study principles and design of jigs and fixtures on CNC machines	2	1	3	3

**Course Title: Design of Machine Members-II**

**Course code: R1631033**

CO No	CO Statement	POs				
		PO1	PO2	PO3	PSO1	PSO2
C303.1	Select the suitable bearing based on the application	2	3	3	3	3
C303.2	Design the prime IC Engines parts.	2	3	3	3	3
C303.3	Design of curved beams, crane hooks, c –clamps.	2	3	3	3	3
C303.4	Design power transmissions systems such as belts, chains, pulleys, ropes and power screws.	2	3	3	3	3
C303.5	Design Spur & Helical Gear Drives.	2	3	3	3	3
C303.6	Design machine tool elements (Levers and brackets) and wire ropes	2	3	3	3	3

**Course Title: Operations Research**

**Course code: R1631034**

CO No	CO Statement	POs			
		PO1	PO2	PO3	PSO2
C304.1	Solve the Linear programming problems	2	2	2	2
C304.2	Solve the Transportation, Assignment and Sequencing methods	2	2	2	2
C304.3	Solve the Replacement problems	2	2	2	2
C304.4	Apply Theory of games and Waiting lines for industrial applications	2	2	2	2
C304.5	Choose the best Inventory plan for the industry needs	2	2	2	2
C304.6	Solve the Dynamic programming and simulation	2	2	2	2

**Course Title: Thermal Engineering-II**

**Course code: R1631035**

CO No	CO Statement	POs				
		PO1	PO2	PO3	PSO1	PSO2
C305.1	Describe knowledge of Rankine cycle and heat equations in different processes, and improving efficiency techniques.	2	2	2	3	3
C305.2	Explore their knowledge & ability to design the constructional features of various types of boilers in various fields of energy transfer equipments.	2	2	2	3	3
C305.3	Apply nozzles and impulse turbines for practical applications	2	2	2	3	3
C305.4	Design reaction turbines and condensers with desired needs within realistic constraints related thermal fields like different types of power plants etc.	2	2	2	3	3
C305.5	Explain the working of gas power plant cycle and also should be able to analyze and evaluate the performance of individual components.	2	2	2	3	3
C305.6	Illustrate the basic principles of Jet propulsion and rocket engineering.	2	2	2	3	3

**Course Title: Theory of Machines Lab**

**Course code: R1631036**

CO No	CO Statement	POs		
		PO1	PO4	PSO1
C306.1	Determine the frequency of undamped and damped for free and force vibration of equivalent spring mass system	2	3	2
C306.2	Study the different types of gears and screw jack	2	3	2
C306.3	Analyse the motorised gyroscope and studying static and dynamic load balancing for rigid bodies.	2	3	2
C306.4	Compare the performance of Porter and Proell Governor	2	3	2
C306.5	Analyse and determine the sleeve lift of Hartnell governor and	2	3	2



	whirling of shaft.			
C306.6	Experiment the balancing of rotary and reciprocating masses	2	3	2

**Course Title: Machine Tools Lab**

**Course code: R1631037**

CO No	CO Statement	POs		
		PO1	PO4	PSO1
C307.1	Explain parts of lathe machine and operate with understanding of work holders and operating principles to produce different part features to the desired quality – Step turning, taper turning, thread cutting and knurling on lathe machine.	2	3	3
C307.2	Explain parts of drilling machine and operate with understanding of work holders and operating principles to produce different part features to the desired quality – Drilling and tapping on drilling machine.	2	3	3
C307.3	Explain parts of Shaping and planning machine and operate with understanding of work holders and operating principles to produce different part features to the desired quality.	2	3	3
C307.4	Explain parts of various machine tools (Slotting and Milling) and operate different machine tools (Slotting and Milling) with understanding of work holders and operating principles to produce different part features to the desired quality – Slotting and Milling machine.	2	3	3
C307.5	Explain parts of various machine tools (cylindrical grinder, surface grinder) and operate different machine tools (cylindrical grinder, surface grinder) with understanding of work holders and operating principles to produce different part features to the desired quality – cylindrical grinder, surface grinder machine.	2	3	2
C307.6	Explain parts of tool and cutter grinder and operate tool and cutter grinder with understanding of work holders and operating principles to produce different part features to the desired quality – tool and cutter grinder machine (Grinding of tool angles).	2	3	2

**Course Title: Thermal Engineering Lab**

**Course code: R1631038**

CO No	CO Statement	POs			
		PO1	PO4	PSO1	PSO2
C308.1	Sketch Valve and Port timing diagrams of 4-stroke and 2-stroke engines respectively	2	2	3	2
C308.2	Examine the performance parameters of internal combustion engines	2	2	3	2
C308.3	Assess the efficiency of reciprocating air compressor.	2	2	3	2
C308.4	Evaluate the energy distribution by conducting heat balance test on IC engines	2	2	3	2
C308.5	Estimate the steam quality by throttling and separating calorimeter	2	2	3	2
C308.6	Determine the performance of air conditioning system	2	2	3	2

**Course Title: Metrology**

**Course code: R1632031**

CO No	CO Statement	POs			
		PO 1	PO 4	PSO1	PSO 2
C309.1	To learn Inspection of engineering parts with various precision instruments like vernier gauge, probe measuring instrument e.t.c.	2	1	2	1
C309.2	To learn Design of part by considering tolerances and fits for good performance of the part	2	1	2	1
C309.3	To learn Principles of measuring instruments and gauges and their uses in various industries and organizations	2	1	2	1
C309.4	To learn Evaluation and inspection of surface roughness	2	1	2	1
C309.5	To learn Inspection of spur gear and thread elements	2	1	2	1
C309.6	To learn Machine tool testing to evaluate machine tool quality	2	1	2	1

**Course Title: Instrumentation and Control Systems**

**Course code: R1632032**

CO No	CO Statement	POs			
		PO 1	PO 4	PSO1	PSO 2
C310.1	To understand the basic principles of measurement, types of errors, transducers and calibration procedures	2	1	2	1
C310.2	To understand the various temperature measuring devices like thermocouple, thermometer, thermistors. Also to understand the various pressure measuring devices such as manometers, bourdon pressure gauges etc.,.	2	1	2	1
C310.3	To gain the knowledge on level indicators, measurement of flow such as rota meter, to measure the speed, principles of seismic instruments etc.	2	1	2	1
C310.4	Ability to understand the Various types of stress and strain measurements, and to know the bending compressive and tensile strains.	2	1	2	1
C310.5	to understand how to measure moisture and also to measure torque, Elastic force meters, load cells, torsion meters, dynamometers.	2	1	2	1
C310.6	Ability to gain the basic principles on open and closed systems, servomechanisms and also speed and position control methods.	1	1	1	1

**Course Title: Refrigeration and Air Conditioning**

**Course code: R1632033**

CO No	CO Statement	POs					
		PO1	PO2	PO3	PO4	PSO1	PSO2
C311.1	Understand the necessity and application of refrigeration system	1	2	1	1	3	2
C311.2	Explain the working and essential components of simple vapour refrigeration cycle.	1	2	1	1	3	2
C311.3	Describe functional components of vapour compression refrigeration system	1	2	1	1	3	2
C311.4	Describe vapour absorption systems and its functional components	1	2	1	1	3	2
C311.5	Demonstrate basic principle of psychometric properties of vapour in air-conditioning system.	1	2	1	1	3	2
C311.6	Illustrate air-conditioning system components	1	2	1	1	3	2

**Course Title: Heat Transfer**

**Course code: R1632034**

CO No	CO Statement	POs					
		PO 1	PO 2	PO 3	PO 4	PSO1	PSO 2
C312.1	Explain the basic principles of heat transfer to basic engineering systems and can solve problems involving steady state heat conduction with and without heat generation in simple geometries.	2	3	2	1	3	3
C312.2	Evaluate heat transfer in fins and transient heat conduction systems	2	3	2	1	3	3
C312.3	Describe the concept of boundary layer formation over heated surfaces during forced and free convection processes.	2	3	2	1	3	3
C312.4	Explain film wise and drop wise condensation process in condensers and also describe the evaluation of Reynolds and Nusselt numbers for boiling and condensation	2	3	2	1	3	3
C312.5	Impart to calculate fluid temperatures, mass flow rates, pressure drops, heat exchange and effectiveness during parallel, counter and cross flow in simple and baffled-shell and tube type heat exchangers, condensers, evaporators, etc.	2	3	2	1	3	3
C312.6	Develop the concept of monochromatic and total radiations, intensity of radiation, shape factor, radiation shields, solar radiation and estimation of radiation heat exchange between two or more surfaces of different geometries.	2	3	2	1	3	3

**Course Title: Heat Transfer lab**

**Course code: R1632036**

CO No	CO Statement	POs				
		PO 1	PO 3	PO 4	PSO1	PSO 2
C313.1	Determine the thermal conductivity of different metallic materials.	2	2	2	3	2
C313.2	Examine the rate of heat transfer between solid boundaries.	2	2	2	3	2
C313.3	Select the appropriate dimensional and functional parameters for heat transfer devices.	2	2	2	3	2
C313.4	Apply the basic heat transfer mechanisms for various heat transfer phenomenon.	2	2	2	3	2
C313.5	Examine the rate of heat transfer between fluids boundaries.	2	2	2	3	2
C313.6	Evaluate the COP of refrigeration system.	2	2	2	3	2

**Course Title: Metrology & Instrumentation lab**

**Course code: R1632037**

CO No	CO Statement	POs			
		PO1	PO4	PSO1	PSO2
C314.1	Familiar with the different instruments that are available for linear, angular, roundness and roughness measurements	1	2	2	1
C314.2	Conduct machine tool alignment test on the lathe, drilling and milling machine	1	2	2	1
C314.3	Perform thread inspection with two wire/ three wire method & tool makers microscope.	1	2	2	1
C314.4	Calibrate various instruments for measuring pressure.	1	2	2	1
C314.5	Select proper measuring instrument and know requirement of calibration, errors in measurement etc.	1	2	2	1
C314.6	Calibrate various instruments for measuring speed, vibration etc.	1	2	2	1

**Course Title: CAD/CAM**

**Course code: R1641032**

CO No	CO Statement	POs			
		PO1	PO5	PSO1	PSO2
C402.1	Understand the importance of computer graphics in the Computer Aided Design	1	2	3	3
C402.2	Apply the Geometric Modelig techniques in drafting and designing the parts and products	1	2	3	3
C402.3	Formulate the programming for CNC manufacturing	1	2	3	3
C402.4	Apply the Group Technology concepts for the manufacturing of new parts and products	1	2	3	3
C402.5	Identify the appropriate Quality control methods	1	2	3	3
C402.6	Identify the various elements and their activities in the Computer Integrated Manufacturing Systems	1	2	3	3

**Course Title: Finite Element Method**

**Course code: R1641033**

CO No	CO Statement	POs				
		PO1	PO2	PO3	PSO1	PSO2
C403.1	Illustrate the Stress and equilibrium, Strain - Displacement Relations and Variational and Weighted	2	3	2	2	2

	Residual Methods					
C403.2	Explain the Discretization of Domain and Procedures, Band Width, Node Numbering, Mesh Generation.	2	3	2	2	2
C403.3	Identify the application and characteristics of FEA elements such as trusses and beams	2	3	2	2	2
C403.4	Solve the 2-D Stress Analysis with CST element and Axi-Symmetric Formulation	2	3	2	2	2
C403.5	Make use of 1-D quadratic and cubic elements and 2-D 4 Nodded Isoperimetric elements and Numerical Integration for solving problems.	2	3	2	2	2
C403.6	Apply Steady state Heat Transfer Analysis and Dynamic Analysis to solve problems	2	3	2	2	2

**Course Title: Power Plant Engineering**

**Course code: R1641034**

CO No	CO Statement	POs						
		PO1	PO2	PO3	PO6	PO7	PSO1	PSO2
C404.1	Understand the various sources of energy	1	1	1	2	2	2	2
C404.2	Gain the knowledge regarding Equipment, Plant layout, principle of working of various diesel and gas turbine plants	1	1	1	2	2	2	2
C404.3	Understand the various combustion systems	1	1	1	2	2	2	2
C404.4	Familiarize the working principles of various nuclear reactors.	1	1	1	2	2	2	2
C404.5	Discuss the working principle and basic components of the hydro electric plants and the economic principles and safety precautions involved with it.	1	1	1	2	2	2	2
C404.6	Discuss and analyze the mathematical and working principles of different electrical equipments involved in the generation of power	1	1	1	2	2	2	2

**Course Title: Mechatronics Lab**

**Course code: R1641035**

CO No	CO Statement	POs	
		PO1	PO4
C405.1	Study of sensors and experimentation of their characters for industrial applications.	3	1
C405.2	Develop an understanding of PLC ladder diagram related to industrial automation systems and measure its performance.	3	1
C405.3	Study of Hydraulic and Pneumatic Actuating Systems and its industrial applications	3	1

C405.4	Develop pneumatic circuit /hydraulic/ electrical circuits for industrial applications and measure its performance using Simulation Software.	3	1
C405.5	Programming using MATLAB from basics to Specific Application	3	1
C405.6	Develop an understanding of PLC ladder diagram	3	1

**Course Title: Production Planning & Control**

**Course code: R1642031**

CO No	CO Statement	POs		
		PO2	PO3	PSO2
C406.1	Apply the systems concept for the design of production and service systems.	2	1	1
C406.2	Predict forecasts in the manufacturing and service sectors using selected quantitative & qualitative techniques.	2	2	1
C406.3	Explain the importance and function of inventory, apply selected techniques for its control and management under dependent and independent demand circumstances.	2	2	1
C406.4	Use their knowledge & ability on Routing.	2	1	1
C406.5	Apply the principles and techniques for planning and control of the production and service systems to optimize/make best use of resources.	2	2	1
C406.6	Classify dispatching and also able to explain the types of follow up & the application of computer in PPC	2	1	1

**Course Title: Unconventional Machining Process**

**Course code: R1642032**

CO No	CO Statement	POs		
		PO	PSO1	PSO2
C407.1	Explain the Ultrasonic machining process and identify the process parameters, their effect and applications	1	3	2
C407.2	Impart the knowledge of Electro chemical machining and Its Applications	1	3	2
C407.3	Know the Thermal metal removal processes and selection of too electrode and dielectric fluids, surface finish and machining accuracy, characteristics of spark eroded surface	1	3	2
C407.4	Learn Electron Beam Machining, Laser Beam Machining of Basic principle and theory, mechanics of material removal, process parameters, efficiency & accuracy, applications	1	3	2
C407.5	Impart the knowledge of Plasma Machining, Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries	1	3	2
C407.6	Learn Abrasive jet machining, Water jet machining and its applications	1	3	2

**Course Title: Automobile Engineering**

**Course code: R1642033**

CO No	CO Statement	POs			
		PO2	PO3	PSO1	PSO2
C408.1	Describe the Various Components of Automobile Vehicles, Chassis, Engines and it's Construction, Lubrication and	1	1	1	3

	Service				
C408.2	Analyse the transmission systems transmission system	1	1	1	3
C408.3	Explain the steering system, it's Geometry and Steering mechanisms	1	1	1	3
C408.4	Demonstrate how the Suspension, Braking and the Electrical systems operate	1	1	1	3
C408.5	Demonstrate various safety systems related to automobiles.	1	1	1	3
C408.6	Illustrate the Exhaust Emission Control Techniques and Servicing of various parts of Engine.	1	1	1	3

### List of Courses (ODDSEM) and Outcomes

No	Course Code	Course Title
1	20BSX13	Numerical Methods & Transformations
2	20CE302	Building Planning & Drawing
3	20CE303	Surveying
4	20CE304	Strength of Materials
5	20CE305	Fluid Mechanics
6	20CE306	Surveying Laboratory
7	20CE307	Strength of Materials Laboratory
8	20CE308	Fluid Mechanics & Hydraulic Machinery Laboratory
9	20CES01	Computer Aided Building Drawing
10	20MCX02	Constitution of India
11	R1931014	Environmental Engineering- II (EE-II)
12	R1931013	Water Recourses Engineering- I (WRE-I)
13	R1931012	Concrete Technology (CT)
14	R1931011	Structural Analysis (SA)
15	R193101G	Environmental Pollution Control (EPC)
16	R193101E	Construction Technology and Management (CTM)
17	R1931015	Concrete Technology lab (CT LAB)
18	R1931016	Surveying Field Work – II (SFW-II)
19	R1641011	Environmental Engineering- II
20	R1641012	Water Recourses Engineering- II
21	R1641013	Geotechnical Engineering-II
22	R1641014	Remote Sensing & GIS
23	R164101C	Air Pollution & Control
24	R164101H	Environmental Impact Assessment & Management
25	R1641017	GIS & CAAD Lab
26	R1641018	Irrigation Design & Drawing Lab
27	R1641019	Intellectual & Patent Rights



### List of Courses (EVENSEM) and Outcomes

No	Course Code	Course Title
1	20HSX03	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
2	20CE402	HYDRAULICS AND HYDRAULIC MACHINERY
3	20CE403	CONCRETE TECHNOLOGY
4	20CE404	SOIL MECHANICS
5	20CE405	CONSTRUCTION PROJECT MANAGEMENT
6	20CS407	PYTHON PROGRAMMING LAB
7	20CE407	CONCRETE TECHNOLOGY LAB
8	20CE408	SOIL MECHANICS LAB
9	20CES02	BUILDING INFORMATION MODELING LAB
10	R1932011	DESIGN & DRAWING OF REINFORCED STRUCTURES (DDRS)
11	R1932012	WATER RESOURCE ENGINEERING-II (WRE-II)
12	R1932013	GEO- TECHNICAL ENGINEERING (GTE-I)
13	R1932014	MANAGERIAL ECONOMICS AND FINANCE ANALYSIS (MEFA)
14	R193201C	PRE-STRESSED CONCRETE (PSC)
15	R193201C	ELEMENTS OF CIVIL ENGINEERING ( ECE)
16	R1932015	CAD LABORATORY
17	R1932016	ENVIRONMENTAL ENGINEERING LABORATORY
18	R1932017	SOCIAL RELEVANT PROJECT (SRP)
19	R1642013	PRESTRESSED CONCRETE (PSC)
20	R164201C	SOLID & HAZARDOUS WASTE MANAGEMENT (SHWM)
21	R1642011	ESTIMATION SPECIFICATIONS & CONTRACTS (ESC)
22	R1642012	CONSTRUCTION TECHNOLOGY & MANAGEMENT (CTM)

### **List of Courses (ODDSEM) and Outcomes**

#### **20BSX13- Numerical Methods and Transforms**

1. Calculate the approximate roots of the algebraic equations & Transcendental equations by different techniques
2. Make use of the concepts of interpolation to estimate the unknown functional values
3. Find approximate values of finite integrals using different numerical techniques and use different algorithms for approximating solutions of ordinary differential equation to its analytical computations
4. Apply the Laplace transform to solve ordinary differential equations with initial conditions
5. Solve engineering problems using Fourier Transforms

#### **20CE302- Building Planning & Drawing**

1. Identify the factors to be considered in planning of buildings
2. Recognize different types of sign conventions and bonds in the building construction
3. Plan different types of building following the Bye - Laws
4. Implementing the construction practices and techniques for Doors, Windows, Ventilator and Roof trusses
5. Draw the plan, section and elevation of a building

#### **20CE303- Surveying**

1. Identifying the basic concepts of surveying its principles and usage of chain, tape, compass and plane table instruments
2. Determine the reduced level obtained by leveling and prepare contour maps and calculate the earth work volume and capacity of reservoirs and measuring the horizontal, vertical angles including tachometry using theodolite
3. Executing the setting out the curve in field, conduct control surveying and possible errors and rectification in surveying
4. Explaining photogrammetry and data acquisition process, creation of stereo model and preparation of DTM, DEM, Aero triangulation and making of Ortho photos
5. Summarizing the Geographic Information System (GIS) as effective modern map making tool

#### **20CE304- Strength of Materials**

1. Categorizing various types of stresses and strains developed in the member
2. Interpreting the bending and shear stress distribution of a member
3. Compute the deflection of beams by different methods and selection of method for determining slope or deflection
4. Describe the failure modes for various types of columns
5. Illustrating the members subjected to torsion

#### **20CE305 Fluid Mechanics**

1. Summarizing the properties of fluid and forces acting on a fluid at rest
2. Describing the principles of mass and energy conservation in Fluid kinematics and dynamics
3. Illustrate the principles of laminar flow in pipe flow
4. Illustrate the principles of turbulent flow in pipe flow

5. Interpret the concept of boundary layer, drag and lift in fluid flow

#### 20CE306 Surveying Lab

1. Recognize, select and use appropriate equipment for finding the horizontal and vertical properties understanding the limitations of the equipments
2. Explain the chaining, ranging and apply it to take the angular measurement and Identify local attraction and appropriate methods to rectify it
3. Calculate the irregular traverse area using Plane table methods, Collect the level of different points and calculate the reduced level of the respective points by appropriate methods
4. Illustrate the lens principle to find the tachometric constants. Setting out of curve by linear and angular methods and trigonometric leveling
5. Identify the ground co-ordinates with elevation of earth surface points with help of GPS and explain Aerial photo Interpretation through stereo model creation with help of provided aerial photographs. Calculate the area and volume using total station

#### 20CE307 Strength of Materials Lab

1. Recognize, select and use appropriate equipment for finding the mechanical properties of materials and understanding the limitations of the equipments
2. Estimate compressive strength of wood, concrete, brick materials and decide their suitability for the construction purpose
3. Evaluate the tensile strength and comment on their usage in reinforced concrete structures
4. Determine the impact resistance of steel used in construction works
5. Determine the young's modulus of wood/steel material and shear modulus of rigidity for helical spring

#### 20CE308 Fluid Mechanics and Hydraulics Lab

1. Recognize, select and use appropriate equipment and hydraulic machinery for finding the fluid properties understanding the limitations of the equipments and machinery
2. Estimate the discharge in pipes and canals using flow meters and notches
3. Estimate energy loss in pipe system
4. Estimate the performance characteristics of hydraulic turbines and pumps
5. Gain proficiency in designing efficient pipe systems and hydraulic machinery

#### 20CES01 Computer Aided Building Drawing

1. Recognize, select and use appropriate drawing commands for drafting understanding the limitations of the soft computing tools
2. Recognize the various drafting tools and understand the limitations with theoretical knowledge
3. Apply commands for two and three dimensional drawing
4. Gain proficiency in creating plans and elevations of buildings
5. Read the building plan for onsite execution

#### 20MCX02 Constitution of India

1. Summarizing the basic features and modalities about Indian Constitution
2. Identify the Indian Federalism and Panchayath Raj systems in Indian Constitution
3. Identify the Legislature and Judiciary systems in Indian Constitution
4. Interpreting the political system that exists in India
5. Categorizing the contemporary issues in global politics and Election commission in India

### R1931014 Environmental Engineering – II

1. Plan and design the sewerage systems by estimating the flow
2. Design of Plumbing and appropriate appurtenances in the sewerage systems
3. Estimation of BOD and COD and Suggest a suitable disposal
4. Analyze sewage and design suitable treatment system
5. Design of sewage treatment systems like Septic tank soak pit system and understanding tertiary treatment of sewage & bio solid management, handling and treatment

### R19310503 Water Resource Engineering –I

1. Introduce hydrologic cycle and its relevance to Civil engineering
2. Make the students understand physical processes of precipitation abstractions from precipitation
3. Be able to determine storage capacity and life of reservoirs and develop unit hydrograph and synthetic hydrograph
4. Learn measurement and estimation of the components hydrologic cycle, floods, routings, flood frequency analysis, design flood
5. Understand the types of aquifers and parameters, types of wells and yield of wells

### R1931012 Concrete Technology

1. Categorizing the properties of concrete
2. the properties of construction material and fresh and hardened concrete
3. Determining the strength of hardened concrete by Non - destructive testing methods
4. Implementing special concrete methods depending upon site conditions
5. Preparing the concrete mix design and recommend the use of construction materials as per IS code for building construction

### R164101C Air Pollution and Control

1. Understand the basic concepts of air pollutants and its impacts
2. Applications in the removal of gases
3. Understand the meteorological dispersion of pollutants
4. Monitor air pollutants and modeling for dispersion
5. Operate and control the air pollution
6. Identify the control methods for air pollution

### R164101H Environmental Impact Assessment and Management

1. Prepare EMP, EIS, and EIA report
2. Identify the risks of a particular project
3. Select an appropriate EIA methodology
4. Evaluation the EIA report
5. Estimate cost benefit ratio of a project
6. Know the role of stakeholder in the preparation of EIA

### **List of Courses (EVENSEM) and Outcomes**

#### **20HSX03 Managerial Economics and Financial Analysis**

1. Understand the theoretical concepts of managerial economics to make decisions for business problems
2. Gain adequate theoretical knowledge on microeconomics concepts to perform successful business operations
3. Understand the basic accounting principles to prepare final Accounts
4. Apply Financial planning techniques to make successful long term investment decisions
5. Apply accounting concepts to analyze financial strength of business

#### **20CE402 Hydraulics and Hydraulic Machinery**

1. Demonstrate the properties of flow channel and flow characteristics in an open channel flow
2. Describing the principals of Dimensional Analysis
3. Illustrate the essential parameters of the Turbo Machinery
4. Interpret the characteristics of Pelton wheel, Francis turbine, Kaplan turbine
5. Demonstrate the working principles of Centrifugal pumps and Reciprocating pumps

#### **20CE403 Concrete Technology**

1. Categorizing the properties of concrete
2. Summarizing the properties of construction material and fresh and hardened concrete
3. Determining the strength of hardened concrete by Non - destructive testing methods
4. Implementing special concrete methods depending upon site conditions
5. Preparing the concrete mix design and recommend the use of construction materials as per IS code for building construction

#### **R1932012 Water Resources Engineering – II**

1. Ability To Design Irrigation Canals And Canal Network
2. Plan An Irrigation System
3. Design Irrigation Canal Structures
4. Plan And Design Diversion Head Works
5. Analyze Stability Of Gravity And Earth Dams

#### **R1932011 Design & Drawing of Reinforced Concrete Structures**

1. Familiarize Students with different design philosophies
2. Equip student with design of members in flexural and shear
3. Understand bond and torsion
4. Familiarize with design of compression members under different types of loading
5. Understand different types of footings and design

### R193201H Elements of Civil Engineering

1. Basics of Civil Engineering concepts
2. The surveying the elevations and mapping
3. The construction materials and elements
4. Water resource development
5. Overall infrastructure development

### R164201C Solid & Hazardous Waste Management

1. Design the collection systems of solid waste of a town
2. Design treatment of municipal solid waste and landfill
3. Know the criteria for selection of landfill
4. Characterize the solid waste and design a composting facility
5. Know the Method of treatment and disposal of Hazardous wastes

### R1642011 Estimation Specification & Contracts

1. Understand the quantity calculations of different components of the buildings
2. Understand the rate analysis of different quantities of the building components
3. Learn various specifications and components of the buildings
4. The student should be able to determine the quantities of different components of the buildings
5. The student should be in a position to find the cost of various building components
6. The student should be capable of finalizing the value of the structures

### R1642013 Prestressed Concrete

1. Understand the basic concept of prestressing
2. Understand the different methods of prestressing
3. Estimate effective prestress including the short- and long-term losses
4. Analyze and design prestressed concrete beams under flexure and shear
5. Understand the relevant IS Codal provisions for prestressed concrete
6. Analysis of Transfer of Prestress in pre tensioned members

## **SEMESTER-I**

### **1. Management Theory and Organization Behavior**

- Explain the transition process of management thought from traditional period to modern approaches
- Transfer the understanding of functions of management into a practical situation
- Identify and analyze the factors affecting individual behavior
- Compare and contrast various theories on motivation and develop strategies for resolving group conflict
- Analyze organizational culture and learning of organizational culture in organization

### **2. Quantitative Analysis for Business Decisions.**

- To use matrix methods for solving simultaneous linear equations useful for various managerial applications
- To understand the cause and effect relationship between different variables useful for business decision-making.
- To apply transportation methods solving of various managerial problems
- To apply linear programming Techniques to find out the effective solutions. For various Managerial problems.
- To apply PERT and CPM Techniques to optimize the time and cost

### **3. Managerial Economics**

- Integrate economics framework with business management
- Outline the practical issues of demand and supply conditions for managerial decisions
- Analyse the competition levels and adopt pricing strategies and other decisions.
- Apply business decisions for growth and expansion by understanding the various economic functions.
- Understand the impact of macroeconomic indicators.

### **4. Business Environment**

- Understand the economic systems and major economic reforms in India
- Analyze the environment of a business and understand the cause of industrial sickness
- Evaluate the monetary policy and fiscal policy of the country
- Explain the mechanisms and policies governing the international business Environment
- Discuss various elements of Indian Trade policy

### **5. Accounting for Managers**

- Understand basic principles, concepts and conventions of accounting
- Construct final accounts for a business firm through formal accounting process
- Identify and appraise various sources of capital and their features.
- Analyze financial statements and judge the financial performance of a firm

- Understand the financial reporting and its types

#### **6. Business Communication and Soft Skills**

- Student will acquire and demonstrate effective business writing and presentation skills
- Student is able to acquire the capability to understand the impact of intra and interpersonal factors on communication
- Student will acquire effective verbal and nonverbal communication skills
- Student will learn to communicate cross culture and wide range of business audience
- Student will acquire report writing skills.

#### **7. Legal Aspects of Business**

- Student will be able to handle disputes/legal challenges pertaining to organization
- Student can apply basic legal knowledge in business transactions.
- Student will be able to understand the legal environment of business pertaining to any organization
- Student will be able to react to the situations in the society by applying consumer protection Act, environmental protection Act and Right to information Act to redress the grievances/issues of the stakeholders.
- Student will be able to understand company laws to organize corporate business.



## **SEMESTER-II**

### **1. Financial Management**

- Understand the concept of financial management, its objectives and roles played By the financial manager.
- Analyze the factors determining the capital structure of an organization
- Compare various investment appraisal techniques
- Understand the factors influencing the dividend declaration in a company
- Evaluate factors determining working capital requirements and understand the factors affecting the working capital of a firm

### **2. Marketing Management**

- Analyze the marketing environment and Competitive forces in the market
- Design appropriate STP strategies and understand the importance of Marketing Research
- Evaluate various elements of Product strategies
- Formulate pricing strategies and distribution channel by considering various factors affecting the same
- Design promotional mix strategies for a business while incorporating ethical considerations

### **3. Human Resource Management**

- Understand recruitment processes and selection procedure
- Assess employee performance and design suitable T&D activities
- Evaluate various elements of Product strategies
- Construct and calculate the salary structure and outline the IR issues
- Compose HR metrics and evaluate the trends of HRM.

### **4. Production And Operations Management**

- Understand the role of Operations in overall Business Strategy of the firm – the application of Operations management policies and techniques manufacturing firms
- Design the conversion system and also to understand the factors influencing while designing a system
- Understand the quality dimensions of the product along with productivity improvement models
- Understand the process scheduling work and also planning the sequence of operations
- Apply latest technologies in operations management

### **5. Research Methodology**

- Understand basic statics and tools for collecting data and designing databases
- Learn how to effectively leverage data for strategic decision making
- Conduct and interpret a variety of hypothesis tests to aid decision making in a business context
- Critically evaluate statistical results
- Formulate and test hypothesis

## **6. Entrepreneurship Development**

- Understand the nature of entrepreneurship and identify personal attributes that Enable best use of entrepreneurial opportunities.
- Analyze various types of Entrepreneurship and successful criteria
- Select products/services, doing feasibility study and prepare detail project report
- Appraise product development, market promotion with environmental change and monitoring financial conditions and funding of the project.
- Analyze Govt. policies and initiatives on supportive schemes and legal issues and liaison with institutions working for the cause.

## **7. Information Technology Lab for Business**

- Enrich the knowledge on information technology in an organization.
- Understand the basic operations and features of SQL.
- Demonstrate the migration from the basic concepts to working with functions using MS Excel.
- Explore the data collection and analyzing techniques..
- Prepare and analyze mathematical documents, presentation, mini projects and reports.

### **SEMESTER-III**

#### **1. Operations Research**

- Understand the nature, models, benefits and limitations of Operations Research
- Apply mathematical models using linear programming techniques
- Demonstrate the transportation and assignment models in business problems
- Illustrate the use of network techniques for successful project implementation
- Demonstrate the queuing and simulation models

#### **2. Human Resource Planning**

- Write sound job descriptions, job specifications and job postings
- Identify Knowledge, Skills, Abilities & Other (KSA&O) human qualities required to perform job successfully.
- Develop a structured, job-related interview for employment screening across all the verticals
- Choose among commercially available testing procedures as appropriate design in different context & Implement a validation study
- Identify legal and ethical concerns in hiring and apply their knowledge to develop a complete, professional hiring plan

#### **3. Compensation Management**

- Demonstrate an understanding of various concepts of performance management and their implications for organizational development
- Apply Performance and Compensation management
- Apply Performance and Compensation
- Analyze the compensation and benefit system of the industry and construct suitable compensation structure as per the organization requirement.
- Concepts in addressing organizational problems to come up with optimal, feasible solutions

#### **4. Industrial Relations**

- Demonstrated scripture knowledge of the field of industrial relations
- Analyze and evaluate the key processes of industrial relations at the workplace level and the relationships to the institutions in a global, economic and social context.
- Investigate solutions to industrial relations problems based on research and assessment of current practices
- Familiarize with the legal requirements to maintain industrial relations.
- Understand the legal requirements to maintain industrial relations.

## **5. Investment Analysis and Portfolio Management**

- Understand how the firms can benefit from various investment avenues in the Financial markets
- Calculate the risk and return of various securities
- Make use of fundamental analysis and technical analysis
- Construct the own portfolio and can do portfolio revision and portfolio evaluation
- Understand portfolio evaluation

## **6. Banking and Financial Services**

- Demonstrate an understanding of banks and other financial institutions.
- Demonstrate an understanding of Indian capital markets depositories and custodians.
- Have in-depth understanding of various financial services like under writing, leasing & hire purchase
- Demonstrate an understanding of concepts and developments in credit rating, factoring,.
- Demonstrate an understanding of Debt policy and Debt management in financial institutions

## **7. Cost management**

- Understand the cost concepts, cost behavior and cost accounting techniques.
- Make use of cost information to application marginal costing techniques
- Understand the budgeting techniques
- Prepare cost audit reports.
- Demonstrate the standard costing methods and techniques to analysis of businesses

## **8. Consumer Behaviour and Customer Relationship Management**

- Acquire an understanding of the concepts and meaning of consumer behavior, marketing communication.
- Demonstrate comprehensive and integrative nature social cultural dimensions of consumer behavior ,factors impacting attitudes and behavior.
- Analyze the importance of psychological and behavioral concepts of consumers thus formulate the to achieve the objectives and excel.
- Make understand the various concepts of opinion leadership
- Understand customer relationship strategies

## **9. Sales and Distribution Management**

- Demonstrate the in conceptual understand in go ft he different concepts, techniques and approaches required for effective decision making in the area of sales management
- Display the skills and knowledge that are critical for generating, evaluating and selecting sales strategies for the company.
- Explain and appreciate an understanding of the contemporary retail management issues, strategies and trends in retailing.

- Demonstrate the significance of retailing and its role in the success of modern world and apply knowledge and insights of retailing to solve an organization's problem.
- Understand global retail marketing concept.

## **10. Advertising and Brand Management**

- Understand Advertising concept and opportunities.
- Demonstrate their conceptual skills in identifying various issues related to Brand Management and the relationship between Corporate Strategy and Brand Management.
- Apply the basic understanding of strategies and tactics involved in brand building, In different sectors.
- Evaluate various methods of valuating brands and the implications in business transactions
- Apply the global branding strategies and management of brands in the organization.

## **11. Supply Chain Management**

- Understand the fundamental Concepts of supply chain and logistics management.
- Demonstrate the concepts on supply chain network design, demand forecasting and inventory management
- Understand performance of Logistic for the effective supply chain performance
- Apply the concepts of transportation, Sourcing and Coordination in the corporate
- To understand the global logistics and SCM and grab the professional opportunities in the field of logistics and supply chain management.

## **12. Enterprise Resource Planning**

- Understand the fundamentals of enterprise resource planning.
- Demonstrate the importance of implementing ERP
- Understand the advantages and disadvantage of different ERP products available in the market
- Apply ERP Programs, map the ERP requirements with business process requirements
- Understand of ERP and ERP products available in the market

## **13. Purchasing and Materials Management**

- Examine the key processes of procurement management in order to assess the roles in a business system.
- Apply the knowledge of procurement to make appropriate procurement decisions in different business situations
- Recommend sourcing strategies through supplier evaluation systems for the acquisition of different products and services.
- Apply key elements of quality management in areas of leadership, customer focus and satisfaction, supplier partnership, employee involvement, performance measures
- Analyze the inventory control process and quality management and reduce variations there by

## **14. Data Mining For Business Decisions**

- Apply Data mining techniques for quicker and better decisions. Whenever there is a need for datamining helps.
- Demonstrate business intelligence tools and data processing knowledge.
- Apply data mining techniques and for business solutions
- Demonstrate web mining application and data base approaches.
- Understand different business applications using datamining.

## **15. Web Designing**

- Understand Web fundamentals and process development
- Explore HTTP
- Develop HTML structures
- Understand cascading style sheets

## **16. Business Analytics**

- understanding of how managers use business Analytics to solve business problems
- Understand Business Analytics for decision making
- Familiarizes the students with the processes needed to develop, report, and analyze business data.

## **SEMESTER-IV**

### **1. Strategic Management And Business Policies**

- Understand strategic management concepts.
- Acquire knowledge on tools and techniques for Strategic analysis.
- Know strategies for competing in globalized environment and markets.
- Know the process of Strategy Evaluation and Control.
- Understand strategy implementation and execution

### **2. Talent Management**

- Demonstrate the knowledge on talent management.
- Apply the concepts of competency methods in talent management.
- Analyze the prominence of performance management in managing the talent.
- Gain the insights of various talent management practices like performance management,
- Gain the insights of various talent management practices like employee engagement, succession and career planning.

### **3. International HRM**

- Demonstrate their conceptual understanding of fundamental concepts of IHRM, its special features and emergence.
- Demonstrate their conceptual knowledge of the recruitment and selection processes in a global business corporation
- Demonstrate their conceptual knowledge of and compensation management practices in MNCs.
- Demonstrate their conceptual skill of industrial relations issues and international HRM strategies.
- Apply their conceptual knowledge of the IHRM in real time problems.

### **4. International Financial Management**

- Understand the role of foreign exchange market in international financial management and the key determinants of exchange rate.
- Gain knowledge about foreign exchange risk management
- Explain the functioning of world financial markets and institutions.
- Gain knowledge about the foreign exchange exposure and management.
- Demonstrate the significance of international financial management in the global context

### **5. Strategic Financial Management**

- Understand the formulation, Implementation and Monitoring of Strategic Financial decisions of the firm
- Understand the Value Based Management and Value Metrics<sup>3</sup>
- Understand the ethical aspects of Strategic financial Management
- Analysis about merger process, legal aspects of Mergers/amalgamations and acquisitions/ takeovers
- Understand takeover procedures.

### **6. Global Marketing Management**

- Demonstrate their conceptual understanding international marketing management process, design and theories
- Apply the major concepts and initiatives relating to the design of international marketing strategy.
- Analyze and apply the important essential ingredients for developing international marketing strategy
- Understand global marketing channels and distribution strategies.
- Analyze concept of export–import business and country wide implications

## **7. Services Marketing**

- Demonstrate the knowledge and understand the uniqueness of services characteristics and its marketing implications.
- Apply concepts, measure and analyze several facets in the area of services marketing essentials for the success of a service sector firm.
- Analyze and interpret the knowledge of principal models of service marketing and the applications in the service sector firm.
- Recognize the challenges faced in services delivery as outlined in the services gap model
- Understand marketing strategies for different services

## **8. Global Supply Chain And Logistics Management**

- Exemplify the concepts of supply chain and logistic from global prospects.
- Execute the knowledge in facing contemporary challenges and taking business decision.
- Analyze the global market demand and manage the companies supply chain and logistics activities globally.
- Evaluate the global purchasing, operating and transporting the goods and services.

## **9. Logistics and Ware House Management**

- Understand the various roles of logistics in competitive strategy.
- Understand the transport functionalities and the suitable modal characteristics of logistics
- Implement different applications in warehouse management for better operations.
- Identify areas for improvement and devise proper distribution channels.
- Enable the various aspects in technology management

## **10. Big Data Analytics**

- Understand the Big Data Platform and its Use cases.
- Provide an overview of Apache Hadoop
- Provide HDFS Concepts and Interfacing with HDFS and Map Reducing programme
- Provide hands on Hadoop Eco System
- Apply analytics on Structured, Unstructured Data. Exposure to Data Analytics with R.



## **11. Enterprise Resource Planning**

- Describe the meaning of ERP.
- Explain the importance of ERP Implementation.
- Distinguish Pre ERP implementation and post ERP implementation.
- Compare ERP System Options and Selection Methods.
- Research on ERP present and future.

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

### Vision

To become Centre of excellence for technically competent, innovative computer engineers

### Mission

1. To provide quality education and spread professional & technical knowledge, leading to a career as computer professionals in different domains of industry, governance and academia
2. To provide state-of-art environment for learning and practice
3. To impart hands on training in latest methodologies and technologies as per industry requirements

### Program Educational Objectives (PEOs)

- PEO1:** Exhibit new age talents that use critical thinking and problem-solving skills in the rapidly changing tech landscape demands dynamism in addition to the application of fundamental and conceptual knowledge meeting client business requirements
- PEO2:** Sustain their satisfactory professional career in their own start-ups or as a team member/ team lead in an IT or allied industry
- PEO3:** Engage in self-directed learning and advanced research based studies relevant to the demand driven need of the industries for their professional and career accomplishments

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

### PROGRAM OUTCOMES (POs)

1. **Engineering Knowledge** : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis** : Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural science, and engineering sciences.
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.
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.
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.
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.
7. **Environments and Sustainability** : Understand the impact of the professional engineering solutions and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics** : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work** : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication** : Communicate effectively in 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.
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.
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.

### PROGRAMME SPECIFIC OUTCOMES (PSOs)

1. Able to apply the theoretical knowledge of Computer science and Engineering and the foundational principles of software development to provide sustainable solutions for the real world technical challenges in the tech landscape by maintaining professional standards, ethical values and integrity.
2. Able to adopt to technological changes by initiating self-paced learning to meet the industry demands.



## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING PROGRAM OUTCOMES (POs)

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**NSRIT** **NADIMPALLI SATYANARAYANA RAJU INSTITUTE OF TECHNOLOGY**

Approved by AICTE, New Delhi; Affiliated to JNTU, Hyderabad; ISO 9001:2015 Certified Institute  
Recognized Under Section 2(f) & 12B of the UGC Act, 1956; NAAC Accredited with 'A' Grade (2016-2020)  
CONTACT: PONDURTHI ANANDAPURAM TOLLWAY, VISAKHAPATNAM - 531115. WEBSITE: www.nsr-it.edu.in

**VISION**

To promote societal empowerment and become an institution of excellence in the field of engineering education and research.

**MISSION**

- To develop the students into outstanding professionals through innovative Teaching - Learning process.
- To uphold research through long term Academia - Industry interaction.
- To inculcate ethical standards and moral values.

**NSRIT** **NADIMPALLI SATYANARAYANA RAJU INSTITUTE OF TECHNOLOGY**  
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**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

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1. To provide quality education and spread professional & technical knowledge, leading to a career as computer professionals in different domains of industry, governance and academia
2. To provide state-of-art environment for learning and practice
3. To impart skills on training in latest methodologies and technologies as per industry requirements

**Program Educational Objectives (PEOs)**

**PEO1:** Enrich new-age talents that use critical thinking and problem-solving skills in the rapidly changing tech landscape demands dynamism in addition to the application of fundamental and conceptual knowledge meeting client business requirements.

**PEO2:** Sustain their satisfactory professional career in their own start-ups or as a team member/ team lead in an IT or allied industry

**PEO3:** Engage in self-directed learning and advanced research based studies relevant to the demand driven need of the industries for their professional and career accomplishments

**NSRIT** NADIPALLI SATYANARAYANA RAJU  
INSTITUTE OF TECHNOLOGY  
(AUTONOMOUS)

Approved by AICTE, New Delhi (U.O.No. 10154, Dated: 15.06.2010) & UPEU, Hyderabad (U.O.No. 10154, Dated: 15.06.2010) & UPEU, Hyderabad (U.O.No. 10154, Dated: 15.06.2010)

**Department of Mechanical Engineering**

**Vision**  
To provide quality education to the students and to develop their technical skills and to make them competent in the field of engineering and technology.

**Mission**  
1. To provide quality education to the students and to develop their technical skills and to make them competent in the field of engineering and technology.  
2. To provide quality education to the students and to develop their technical skills and to make them competent in the field of engineering and technology.  
3. To provide quality education to the students and to develop their technical skills and to make them competent in the field of engineering and technology.

**Program Educational Objectives (PEOs)**  
The PEOs are the educational goals that define the knowledge and skills that a graduate should attain after 4 - 5 years of the program.

**The graduates of Mechanical Engineering at NSRIT are**  
1. Graduate to work in a mechanical engineering organization and to be able to design and develop mechanical systems and components.  
2. Graduate to work in a mechanical engineering organization and to be able to design and develop mechanical systems and components.  
3. Graduate to work in a mechanical engineering organization and to be able to design and develop mechanical systems and components.

**NSRIT** NADIPALLI SATYANARAYANA RAJU  
INSTITUTE OF TECHNOLOGY

**VISION**  
To provide quality education to the students and to develop their technical skills and to make them competent in the field of engineering and technology.

**MISSION**  
1. To provide quality education to the students and to develop their technical skills and to make them competent in the field of engineering and technology.  
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3. To provide quality education to the students and to develop their technical skills and to make them competent in the field of engineering and technology.





**NSRIT** NAGAMPALLI SATYANARAYANA RAJU  
INSTITUTE OF TECHNOLOGY  
AUTONOMOUS

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**Programme Outcomes (POs)**

- PO-1: Graduates will be able to apply knowledge of mathematics, science, engineering fundamentals and engineering graphics to solve engineering problems.
- PO-2: Graduates will be able to identify and define the problem, specify the requirements of the problem and propose feasible solutions.
- PO-3: Graduates will be able to design and develop a system, component or process to meet specific needs and meet requirements in the areas of safety, health, environment, manufacturability, reliability, operability, maintainability and testability.
- PO-4: Graduates will be able to conduct experiments and use standard testing techniques to validate the performance of a system, component or process.
- PO-5: Graduates will be able to use modern tools and techniques for the design and development of a system, component or process.
- PO-6: Graduates will be able to work in a team to solve engineering problems.
- PO-7: Graduates will be able to communicate effectively in written and oral form.
- PO-8: Graduates will be able to understand and follow the professional code of ethics.
- PO-9: Graduates will be able to engage in continuous learning and professional development.
- PO-10: Graduates will be able to contribute to the society and the environment.

**Programme Specific Outcomes (PSOs)**

- PSO-1: Graduates will be able to design and develop a system, component or process to meet specific needs and meet requirements in the areas of safety, health, environment, manufacturability, reliability, operability, maintainability and testability.
- PSO-2: Graduates will be able to conduct experiments and use standard testing techniques to validate the performance of a system, component or process.
- PSO-3: Graduates will be able to use modern tools and techniques for the design and development of a system, component or process.



**NSRIT** NAGAMPALLI SATYANARAYANA RAJU  
INSTITUTE OF TECHNOLOGY  
AUTONOMOUS

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**VISION**

To develop competent graduates in Electronics and Communication Engineering by providing a high quality education.

**MISSIONS**

- M1: To provide a high quality education in Electronics and Communication Engineering.
- M2: To develop competent graduates in Electronics and Communication Engineering.
- M3: To provide a high quality education in Electronics and Communication Engineering.
- M4: To provide a high quality education in Electronics and Communication Engineering.
- M5: To provide a high quality education in Electronics and Communication Engineering.

**Programme Educational Objectives (PEOs)**

- PEO-1: Graduates will be able to design and develop a system, component or process to meet specific needs and meet requirements in the areas of safety, health, environment, manufacturability, reliability, operability, maintainability and testability.
- PEO-2: Graduates will be able to conduct experiments and use standard testing techniques to validate the performance of a system, component or process.
- PEO-3: Graduates will be able to use modern tools and techniques for the design and development of a system, component or process.





**ADIMPALLI SATYANARAYANA INSTITUTE OF TECHNOLOGY**  
(AUTONOMOUS)

**DEPARTMENT OF DISTANCE EDUCATION AND COMMERCIAL EDUCATION**

**VISION**  
To provide quality education to all students and to develop them as professionals in their respective fields.

**MISSION**  
1. To provide quality education to all students and to develop them as professionals in their respective fields.  
2. To provide quality education to all students and to develop them as professionals in their respective fields.  
3. To provide quality education to all students and to develop them as professionals in their respective fields.

**Program Educational Objectives**  
1. To provide quality education to all students and to develop them as professionals in their respective fields.  
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**ADIMPALLI SATYANARAYANA INSTITUTE OF TECHNOLOGY**  
(AUTONOMOUS)

**DEPARTMENT OF DISTANCE EDUCATION AND COMMERCIAL EDUCATION**

**VISION**  
To provide quality education to all students and to develop them as professionals in their respective fields.

**MISSION**  
1. To provide quality education to all students and to develop them as professionals in their respective fields.  
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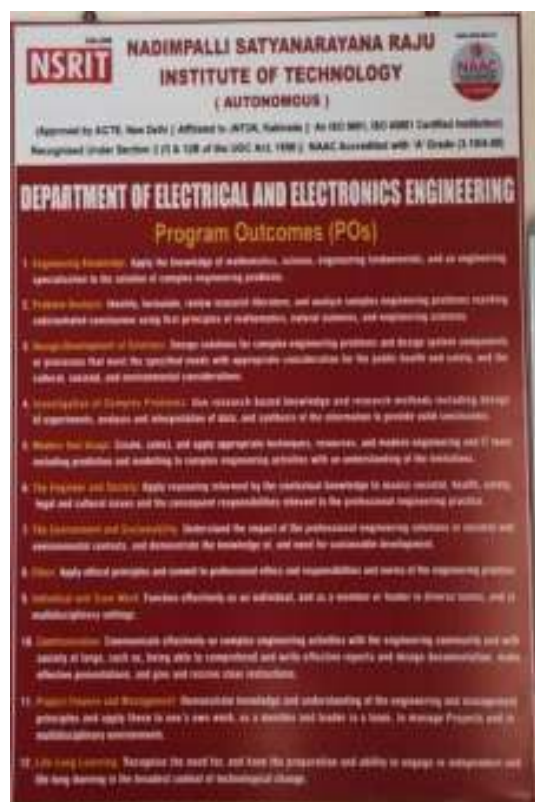


## Vision, Mission, PO's, PEO's and PSO's in EEE Department

### 1. Department Staff room, Room No:303



### 2. In Room no 301:



3. In Room no 302:

