Course Title		Course Outcomes (COs)
Algebra & Calculus (19ABS9901)	CO1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications
	CO2	Utilize mean value theorems to real life problems
	CO3	Familiarize with functions of several variables which is useful in optimization
	CO4	Students will also learn important tools of caluculus in higher dimensions. Students will become familiar with 2-dimensional coordinate systems
	CO5	Students will become familiar with 3-dimensional coordinate systems and also learn the utilization of special functions
Engineering Chemistry (19ABS9905)	CO1	Understand the disadvantages of using hard water and select suitable treatments domestically and industrially
	CO2	Understand the electrochemical sources of energy
	CO3	Understand the corrosion prevention methods and factors affecting corrosion
	CO4	Understand the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers
	CO5	Understand calorific values, octane number, refining of petroleum and cracking of oils
	CO6	Understand the manufacturing of Portland cement and concrete formation nanomaterial, and different properties of lubricants and their applications.
	CO7	Summarize the application of SEM, TEM and XRD in surface characterization
Problem Solving and Programming (19AES0501)	CO1	Create interactive visual programs using Scratch.
	CO2	Develop flowcharts using raptor to solve the given problems.
	CO3	Develop Python programs for numerical and text based problems
	CO4	Develop graphics and event based programming using Python
	CO5	Develop Python programs using beautiful Pythonic idiomatic Practices
Engineering Workshop Practice (19ALC0301)	CO1	Apply wood working skills in real world applications.
	CO2	Build different parts with metal sheets in real world applications.
	CO3	Apply fitting operations in various applications.
	CO4	Apply different types of basic electric circuit connections.
	CO5	Demonstrate soldering and brazing
Engineering Graphics Lab (19AES0301)	CO1	Draw various curves applied in engineering.
	CO2	Show projections of solids and sections graphically.
	CO3	Draw the development of surfaces of solids.
	CO4	Use computers as a drafting tool.
	CO5	Draw isometric and orthographic drawings using CAD packages.
Engineering Chemistry Lab (19ABS9910)	CO1	Familiarize the students with the basic concepts of chemistry of materials
	CO2	Prepare advanced polymer materials
	CO3	Measure the strength of an acid present in secondary batteries
	CO4	Familiarize with digital and instrumental methods of analysis
	CO5	Construct a Computer given its parts

Problem Solving and Programming Lab (19AES0503)	CO1	Select the right control structure for solving the problem
	CO2	Analyze different sorting algorithms
	CO3	Design solutions for computational problems
	CO4	Develop C programs which utilize the memory efficiently using programming constructs like pointers.
	CO5	Familiarize the students with the basic concepts of chemistry of materials
Basics of Electrical & Electronics Engineering (19AES0202)	CO1	Apply concepts of KVL/KCL in solving DC circuits
	CO2	Illustrate working principles of induction motor - DC Motor
	CO3	Identify type of electrical machine based on their operation
	CO4	Describe operation and characteristics of diodes and transistors.
	CO5	Make use of diodes and transistors in simple, typical circuit applications.
	CO6	Understand operation of basic op-amp circuits
Differential Equations and Multivariable Calculus (19ABS9906)	CO1	Apply the mathematical concepts of ordinary differential equations of higher order
	CO2	Solve the differential equations related to engineering fields
	CO3	Identify solutions for partial differential equations that model physical process
	CO4	Interpret physical meaning of different operators such as gradient. Curl, divergence.
	CO5	Estimate the work done by field, circulation and flux using vector calculus.
Engineering Physics (19ABS9903)	CO1	Explain physics applied to solve engineering problems.
	CO2	Apply the principles of acoustics and ultrasonic in engineering applications.
	CO3	Explains the applications of ultrasonic in various engineering fields.
	CO4	Apply electromagnetic wave propagation in different Optical Fibers and the concepts of lasers in various applications.
	CO5	Explains the concepts of dielectric and magnetic materials and Identify the sensors for various engineering applications
Data Structures (19AES0502)	CO1	Select Appropriate Data Structure for solving a real world problem
	CO2	Select appropriate file organization technique depending on the processing to be done
	CO3	Construct Indexes for Databases
	CO4	Analyze the Algorithms
	CO5	Develop Algorithm for Sorting large files of data
Communicative English I (19AHS9901)	CO1	Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
	CO2	Formulate sentences using proper grammatical structures and correct word forms
	CO3	Speak clearly on a specific topic using suitable discourse markers in informal discussions
	CO4	Write summaries based on global comprehension of reading/listening texts
	CO5	Produce a coherent paragraph interpreting a figure/graph/chart/table
	CO6	Take notes while listening to a talk/lecture to answer questions
Communicative English Lab (19AHS9902)	CO1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
	CO2	Apply communication skills through various language learning activities

	CO3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension
	CO4	Evaluate and exhibit acceptable etiquette essential in social and professional settings.
	CO5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English
Mechanical Engineering Workshop (19ALC0302)	CO1	Make moulds for sand casting
	CO2	Develop different weld joints
	CO3	Assemble or disassemble of machine components
	CO4	Make plastic components
	CO5	Use power tools and find applications of hydraulic and pneumatic circuits
Basics of Electrical and Electronics Engineering Lab 19AES0204	CO1	Verify Kirchoff's Laws & Superposition theorem for dc supply
	CO2	Analyze the performance of AC and DC Machines by testing
	CO3	Study I – V Characteristics of PV Cell & Perform speed control of DC shunt motor
	CO4	Ability to operate diodes for finding V-I Characteristics
	CO5	Ability to construct and operate rectifiers without & with filters
	CO6	Ability to construct and operate BJT & FET Characteristics.
Engineering Physics Lab (19ABS9908)	CO1	Analyze the properties of LASER and optical fibers.
	CO2	Analyze the mechanical behavior of a given material using dynamic methods.
	CO3	Evaluate the basic parameters of a given semiconductor material.
	CO4	Analyze the basic properties of dielectric and magnetic behavior of the given material.
	CO5	Apply the concepts of sensors to solve engineering problems.
Data Structures Lab (19AES0504)	CO1	Select the data structure appropriate for solving the problem
	CO2	Implement searching and sorting algorithms
	CO3	Design new data types
	CO4	Illustrate the working of stack and queue
	CO5	Organize the data in the form of files
Probability & Statistics, PDE, Complex Variables (19ABS9913)	CO1	Apply discrete and continuous probability distributions
	CO2	Design the components of a classical hypothesis test
	CO3	Infer the statistical inferential methods based on small and large sampling tests
	CO4	Find the general solution of the PDEs bearing applications
	CO5	Differentiation and integration of complex functions used in engineering problems and equip the students to solve application problems in their disciplines
Communicative English II (19AHS9903)	CO1	Prioritize information from reading texts after selecting relevant and useful points
	CO2	Paraphrase short academic texts using suitable strategies and conventions
	CO3	Make formal structured presentations on academic topics using PPT slides with relevant graphical elements
	CO4	Participate in group discussions using appropriate conventions and language strategies
	CO5	Prepare a CV with a cover letter to seek internship/ job
	CO6	Collaborate with a partner to make presentations and Project Reports

Design Thinking and Product Innovation (19AES0302)	CO1	Summarize the importance of basic sciences in product development
	CO2	Explain the historical developments in mechanical, electrical, communications and computational engineering
	CO3	Apply systematic approach to innovative designs
	CO4	Identify new materials and manufacturing methods in design
	CO5	Explain and study of Product Development
Engineering Mechanics (19APC0301)	CO1	Resolve forces and moments in mechanical systems.
	CO2	Identify the frictional forces and its influence on equilibrium.
	CO3	Find the centre of gravity and moment of inertia for various geometric shapes
	CO4	Demonstrations of equilibrium of ideal systems and estimation of the work done by the force and the couple
	CO5	Determine the displacement, velocity and acceleration relations in dynamic systems
Material Science and Engineering (19APC0306)	CO1	Explain the principles of binary phases
	CO2	Apply heat treatment to different applications
	CO3	Select steels and cast irons for a given application
	CO4	Utilize nonferrous metals and alloys in engineering
	CO5	Choose composites for various applications. Assess the properties of nano-scale materials and their applications
Thermodynamics (19APC0308)	CO1	Explain the importance of thermodynamic properties related to conversion of heat energy into work.
	CO2	Apply the laws of thermodynamics to boilers, heat pumps, refrigerators, heat engines, compressors and nozzles.
	CO3	To understand concept of Entropy and Availability of system
	CO4	Utilize steam properties to design steam based components.
	CO5	Compare thermodynamic relations and air standard cycles.
Environmental Studies (19AMC9903)	CO1	Students get sufficient information that clarifies modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
	CO2	Students realize the need to change their approach, so as to perceive our own environmental issues correctly, using practical approach based on observation and self-learning.
	CO3	Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
	CO4	Interpretation of different types of environmental pollution problems and designing of new solid waste management techniques usage
	CO5	Get knowledge on various environmental acts and to engage all the students life - long learning of rain water harvesting
Communicative English II Lab (19AHS9904)	CO1	Prioritize information from reading texts after selecting relevant and useful points.
	CO2	Make formal structured presentations on academic topics using PPT slides with relevant graphical elements
	CO3	Participate in Group discussions using appropriate conventions and language strategies.
	CO4	Paraphrase short academic text using suitable strategies and conventions.
	CO5	Collaborate with a partner to make presentations and Project

Design Thinking and Product Innovation Lab (19AES0303)	CO1	Gain the knowledge on the principles of design thinking and its approaches
	CO2	Remember the concepts of historical developments in mechanical, electrical, communications and computational engineering
	CO3	Understand the idea generation, prototype and testing in design thinking context
	CO4	Apply design thinking techniques for product innovation
	CO5	Analyze the different product development concepts
Material Science and Engineering Lab (19APC0307)	CO1	Identify various microstructures of steels and cast irons.
	CO2	Visualize grains and grain boundaries
	CO3	Evaluate hardness of treated and untreated steels.
	CO4	Summarize the importance of hardening of steels.
	CO5	Study the Micro structure of Heat treated steels.
Computer Aided Machine Drawing Lab (19ALC0303)	CO1	Demonstrate the conventional representations of materials and machine components
	CO2	Model riveted, welded and key joints using CAD system
	CO3	Create solid models and sectional views of machine components
	CO4	Generate solid models of machine parts and assemble them
	CO5	Create manufacturing drawing with dimensional and geometric tolerances
Transform Techniques and Numerical Methods (19ABS9915)	CO1	Apply the Laplace transform for solving differential equations (continuous systems)
	CO2	Find the Fourier series of periodic signals
	CO3	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
	CO4	Solve linear/nonlinear algebraic and transcendental equations using numerical methods
	CO5	Solve ordinary differential equations by Euler's method, modified Euler's method, Runge Kutta method, Predictor Corrector method and Milne's method
Kinematics of Machinery (19APC0309)	CO1	Enable the students in selection of appropriate mechanisms.
	CO2	Impart the clear idea in constructing velocity & acceleration diagrams for the given mechanism.
	CO3	Provide an overview of straight line motion mechanisms, steering mechanisms and Hooke's joint.
	CO4	Understand the kinematic analysis of gears & gear trains.
	CO5	Develop the knowledge of kinematic analysis of cams.
Internet of Things (IoT) (19AES0505)	CO1	Interpret the vision of IoT from a global context
	CO2	Determine the Market perspective of IoT
	CO3	Compare and Contrast the use of Devices, Gateways and Data Management in IoT
	CO4	Implement state of the art architecture in IoT
	CO5	Illustrate the application of IoT in Industrial Automation and identify Real World Design Constraints
Mechanics of Materials (19APC0302)	CO1	Apply the concepts of stress and strain to machine numbers
	CO2	Determine, shear forces, and bending moments in beams
	CO3	Find slope and deflection in beams, determine shear forces and bending moments in beams
	CO4	Estimate the stresses in machine members such as shafts and springs

	CO5	Estimate the stresses in thin cylinders due to internal pressure
Manufacturing Technology (19APC0304)	CO1	Demonstrate different metal casting processes and gating systems
	CO2	Classify working of various welding processes
	CO3	Evaluate the forces and power requirements in rolling process
	CO4	Apply the principles of various forging operations
	CO5	Outline the manufacturing methods of plastics and ceramics.
Fluid Mechanics & Hydraulic Machinery (19APC0314)	CO1	Interpret the behavior under static and dynamic conditions.
	CO2	Analyze one dimensional viscous flows using conservation laws for compressible and incompressible flows.
	CO3	Apply boundary layer flows for laminar and turbulent regimes.
	CO4	Explain Reynolds stresses and its application
	CO5	Explain different types of pumps and their application.
Biology for Engineers (19AMC9901)	CO1	Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
	CO2	Explain about biomolecules, their structure, function and their role in the living organisms. How biomolecules are useful in Industry.
	CO3	Brief about human physiology.
	CO4	Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
	CO5	Know about application of biological principles in different technologies for the production of medicines and pharmaceutical molecules through transgenic microbes, plants and animals.
Fluid Mechanics & Hydraulic Machinery Lab (19APC0315)	CO1	Interpret the fluid behavior under static and dynamic conditions
	CO2	Analyze one dimensional viscous flow using conservation laws for compressible and incompressible flows
	CO3	Plot velocity and pressure profiles for fluid flow of hydraulic turbines
	CO4	Evaluate the performance characteristics of hydraulic turbines
	CO5	Evaluate the performance characteristics of pumps Interpret the behavior under static and dynamic conditions.
Internet of Things Lab (IoT Lab) (19AES0506)	CO1	Choose the sensors and actuators for an IoT application.
	CO2	Select protocols for a specific IoT application.
	CO3	Utilize the cloud platform and APIs for IoT application.
	CO4	Experiment with embedded boards for creating IoT prototypes
	CO5	Design a solution for a given IoT application
Mechanics of Materials Lab (19APC0303)	CO1	Analyze the strength of the beam, SSB
	CO2	Design the various types of springs and their loads
	CO3	Test the load and strength of bricks, cubes
	CO4	Define and analyze shear test, stress
	CO5	Design the strain, stress and compression
Manufacturing	CO1	Fabricate different types of components using various manufacturing techniques.
	CO2	Carry out Pattern preparation and Estimate the Sand properties

Technology Lab (19APC0313)	CO3	Carry out the Welding process to join the components
	CO4	Carry out Blanking & Piercing operation
	CO5	Adapt material forming methods.
Dynamics of Machines (19APC0325)	CO1	Understand the application of friction in pivots, collars, clutches, brakes, and dynamometers, and also to solve the numerical problems
	CO2	Understand gyroscopic effect on aeroplane, ship, four wheel and two-wheel vehicles. To design a flywheel for reciprocating engine and punching press.
	CO3	Understand the working of various types of governors and to analyze the forces acting on them. To solve numerical problems on balancing of rotating masses
	CO4	Understand that effect of primary and secondary balancing of reciprocating masses in locomotive engines, V-engine, inline engines and Radial engines
	CO5	Understand the concept of different types of vibratory systems and to perform simple calculations of vibration systems
Thermal Engineering – I (19APC0310)	CO1	Student can know working of both S.I and C.I engines with the help of indicator diagrams.
	CO2	Student can understand the fuel supply systems, cooling, lubrication and ignition systems
	CO3	Student can understand the flame propagation inside the cylinder, stages of combustion in S.I and C.I engines
	CO4	Familiar with indicated power, brake power and friction power and their methods of measurement
	CO5	The working of reciprocating and rotary air compressors. Student can calculate work done by single and multistage reciprocating air compressors
Design of Machine Members – 1 (19APC0316)	CO1	Apply design procedures using theories of failure for different elements
	CO2	Able to design simple components under cyclic loading using Goodman's and Soderberg's criterions
	CO3	Able to design riveted joints with different configuration, boiler shell joint design and eccentric loading design of riveted joints
	CO4	Design cotter joint, knuckle joint and shafts
	CO5	Design various rigid and flexible shaft couplings
Machine Tools (19APC0324)	CO1	Understand the basic concepts of the philosophy of metal cutting and the mechanism of chip formation
	CO2	Understand the basic concepts of turning
	CO3	Understand the basic principle of drilling, shaping and planning operation, parts of the drilling
	CO4	Understand the principle of milling, grinding, Lapping, Honing and Broaching operation
	CO5	Understand the design of Jigs and fixtures and uses, Classification of Jigs & Fixtures – Principles of location and clamping
Nano Technology (19APE0304)	CO1	To identify the essential concepts used in nanotechnology
	CO2	To identify the materials, properties
	CO3	To Derive characterization techniques
	CO4	To Characterization of carbon allotropes, synthesis of diamond.
	CO5	To derive Applications in material science, biology and medicine.
Composite materials (19APE0305)	CO1	To study matrix material, reinforcements of polymer matrix composites, MMC and ceramic matrix composites.
	CO2	To develop knowledge on manufacturing methods of composites

	CO3	To develop knowledge on processing techniques and applications of PMCs
	CO4	To develop knowledge on processing techniques and applications of MMCs
	CO5	To develop knowledge on processing techniques and applications of CMCs and Carbon-carbon composites
Renewable Energy Technologies (19APE0306)	CO1	Explain the current energy scenario and requirement of migration to renewable energy sources
	CO2	Understand role significance of solar energy
	CO3	Provide importance of Wind Energy
	CO4	Understand the role of ocean energy in the Energy Generation
	CO5	Understand role of hydrogen in non-conventional energy
Managerial Economics and Financial Analysis (19AHSMB01)	CO1	Understand the fundamentals of Economics and Managerial economics viz., Demand, Production, cost, revenue and markets.
	CO2	Apply the Concept of Production cost and revenues for effective Business decision
	CO3	Analyze how to invest their capital and maximize returns.
	CO4	Evaluate the capital budgeting techniques.
	CO5	Define the concepts related to financial accounting and management and able to develop the accounting statements and evaluate the financial performance of business entity
Artificial Intelligence (19APE0501)	CO1	Apply searching techniques for solving a problem
	CO2	Design Intelligent Agents
	CO3	Develop Natural Language Interface for Machines
	CO4	Design mini robots
	CO5	Summarize past, present and future of Artificial Intelligence
Sensor Networks (19APE0416)	CO1	Understand the concepts of Converters and Sensor data acquisition systems
	CO2	Understand the concepts of Sensor Measurements in Structural Monitoring
	CO3	Understand the concepts of commonly used sensing technologies and Algorithms
	CO4	Understand the concepts of Piezoelectric transducers for assessing and monitoring infrastructures
	CO5	Understand the concepts of Fiber optic sensors for assessing and monitoring infrastructures
Constitution of India (19AMC9902)	CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
	CO2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
	CO3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
	CO4	Discuss the Powers and functions of Governor, President, and Judiciary.
	CO5	Discuss the functions of local administration bodies
Thermal Engineering Lab (19APC0311)	CO1	Understand different parts and mechanisms of IC Engine
	CO2	Understand the working principle of two and four stroke of IC Engine.
	CO3	Understand the working principle and operation of diesel and petrol engine.
	CO4	Evaluate the performance characteristics of IC Engine and air compressor.

	CO5	Understand measurements of engine emissions and study of boilers.
Machine Tools Lab (19APC0305)	CO1	Apply knowledge of tool materials and cutting fluids in the machine shop.
	CO2	Develop the hands-on experience on different machining processes that will enable them to work in a typical machine shop.
	CO3	Apply knowledge of metal cutting parameters, tool wear mechanisms.
	CO4	Understand the basic calculations of machining parameters.
	CO5	Develop the practical knowledge on groove cutting, gear cutting.
Computer Aided Drafting Lab (19APC0315)	CO1	Understand the basic elements of Computer Aided Drafting
	CO2	Acquire knowledge of drafting packages
	CO3	Understand the drafting features
	CO4	Practice drafting of solids and perspective views
	CO5	Practice drafting of Orthographic views
Design of Machine Members – II (19APC0316)	CO1	Design crane hooks, C-clamps and various belt, rope and chain drives
	CO2	Design helical sprigs for two-wheel vehicle and laminated springs for trucks
	CO3	Design journal bearings, ball bearings and roller bearings and to know the advantages of rolling contact bearings
	CO4	Design spur and helical gears for different input conditions
	CO5	Design engine components like Cylinder, piston, connecting rod and crankshaft
Heat Transfer (19APC0317)	CO1	Understand the concept of modes of heat transfer and to solve problems on conduction heat transfer.
	CO2	Understand heat transfer through extended surfaces and solve the problems in 1-D transient conduction heat transfer.
	CO3	Understand concept of the convection heat transfer and to solve practical problems on forced and natural convection heat transfer.
	CO4	Calculate heat transfer in boiling, condensation and understand principle behind heat exchangers and solve problems using LMTD and NTU methods.
	CO5	Understand basic concepts of radiation heat transfer from black and gray bodies and solve problems involving radiation shields.
Thermal Engineering-II (19APC0319)	CO1	Understand efficiency enhancement methods of Reheating and regeneration. Student can able to understand the key role of quality of steam after evaporation
	CO2	Understand the working of different high pressure and low- pressure boilers.
	CO3	Distinguish the ideal flow and actual flow through nozzle. Student can know the importance of maximum discharge through nozzle.
	CO4	Construct the velocity triangle and combined velocity triangle and can learn its importance in determining the power produced by the turbine.
	CO5	Participate in science exhibitions based on the concept of thermal power plants.
Management Science (19APE0316)	CO1	Understand the concepts & principles of management and designs of organization in a practical world.
	CO2	Apply the knowledge of Work-study principles & Quality Controltechniques in industry.
	CO3	Analyze the concepts of HRM in Recruitment, Selection and Training & Development.
	CO4	Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business throughSWOT.
	CO5	Create Modern technology in management science
	CO1	Explain the need of optimization of engineering systems

Optimization Techniques (19APE0317)	CO2	Understand optimization of electrical and electronics engineeringproblems
	CO3	Apply classical optimization techniques, linear programming, simplex algorithm, transportation problem
	CO4	Apply unconstrained optimization and constrained non-linear programming and dynamic programming
	CO5	Formulate optimization problems
Introduction to CAD/CAM (19APE0318)	CO1	Understand the basic concepts components of CAD/CAM. Concepts of Graphics techniques.
	CO2	Understand the concepts of Geometric representation methods.
	CO3	Understand and apply Numerical CNC Part Programming methods.
	CO4	Understand the concepts of Group technology and techniques, production flow Analysis.
	CO5	Understand the concepts of FMS and its elements.
Machine Learning (19APC0513)	CO1	Understand the concepts of computational intelligence like machinelearning
	CO2	Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
	CO3	Understand the Neural Networks and its usage in machine learning Application
Neural Networks and Fuzzy Logic (19APC0216)	CO1	Understand the basic architecture of artificial neural network terminologies and techniques.
	CO2	Understand approaches and architectures of Artificial Intelligence.
	CO3	Perform the training of neural networks using various learning rules.
	CO4	Create different neural networks of various architectures both feed forward and feed backward.
	CO5	Application of ANN to System Identification and Pattern recognition.
Structural Helath Monitoring (19AOE0101)	CO1	Learn about failure and damage detection
	CO2	Study the structural health monitoring in civil engineering structures
	CO3	Know about Sensor technology in civil engineering
	CO4	Study the IOT in SHM
	CO5	Learn about Real time SHM application
Principles of Effective Public Speaking (19AHE9902)	CO1	Apply knowledge of principles, concepts and skills learned in speech preparation.
	CO2	Develop skills in effective listening.
	CO3	Evaluate the delivery of speeches.
	CO4	Develop skills in speech composition.
	CO5	Use supporting materials and presentation aids in speech preparation.
Advanced Numerical Methods (19AHE9904)	CO1	Understand the Formulation Techniques for solving problems used in engineering problems.
	CO2	Apply the Curve Fitting procedures and understand Regression concept.
	CO3	Analyses the Iterative methods of solving problems in Partial differential equations.
	CO4	Know and be able to apply the procedure of solving the solution of Parabolic Equations.
	CO5	Develop to solve techniques for solving problems in Hyperbolic partial differential equations.
	CO1	Analyze electrostatics with their related theorems.

Course	CO	Description
Electromagnetic Theory (19AHE9908)	CO2	Illustrate electrostatics in matter by dielectrics and their properties.
	CO3	Analyze Magneto statics with mathematical proofs.
	CO4	Analyze Maxwell's equations and Electromagnetic wave propagation.
	CO5	Enumerate the applications of Electromagnetic wave propagation
Professional Ethics and Human Values (19AMC9904)	CO1	It ensures students sustained happiness through identifying the essentials of human values and skills.
	CO2	The students will understand the importance of Values and Ethics in their personal lives and professional careers.
	CO3	The students will learn the rights and responsibilities as an employee, team member and a global citizen.
	CO4	Students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.
	CO5	Students can able to develop appropriate technologies and management patterns to create harmony in professional and personal life
Heat Transfer Lab (19APC0318)	CO1	Estimate heat transfer coefficients in forced and natural convection and determine the effectiveness of heat exchangers and heat pipe.
	CO2	Perform the transient heat conduction experiment and obtain the variations of temperature along length of pin-fin.
	CO3	Determine overall heat transfer coefficient for composite walls
	CO4	Perform experiment to determine thermal conductivity of metal rod.
	CO5	Perform radiations experiments and determine the surface emissivity and Stefan boltzman's constant and compare the theoretical values.
Design & Simulation Lab (19APC0320)	CO1	Design of 2D models using software
	CO2	Design of 3D models and analysis
	CO3	Create simulation of any simple components
	CO4	Design and simulation of machine components
	CO5	Analysis of any components using software
Metrology and Measurements (19APC0321)	CO1	Identify techniques to minimize the errors in measurement.
	CO2	Identify methods and devices for measurement of length, angle, and gear & thread parameters, surface roughness and geometric features of parts.
	CO3	Understand the measurements of gear specifications by using precision instruments and estimate the deviations occurred in erection of machine tools using dial gauge and spirit level.
	CO4	Understand the calibration of displacement and speed of components.
	CO5	Understand about standard calibration in force, torque and power measurement.
Operations Research (19APC0323)	CO1	Create mathematical models of the real-life situations and capable of obtaining best solution using Graphical Method and Simplex Method
	CO2	Implement the theory of duality for simplifying the solution procedure for certain LPPs, and solve the special cases of LPP and Assignment problems
	CO3	Knowledge of choosing the best strategy out of the available strategies which is an essential skill for any business manager to successfully face the competition
	CO4	Represent any project in the form of a network and estimate the parameters like Project Completion Time
	CO5	Applying Dynamic Programming technique to solve the complex problems by breaking them into a series of sub-problems

Automobile Engineering (19APC0326)	CO1	Recognize the various parts of the automobile and their functions and materials.
	CO2	Discuss the engine auxiliary systems and engine emission control.
	CO3	Distinguish the working of different types of transmission systems.
	CO4	Explain the Steering, Brakes and Suspension Systems.
	CO5	Predict possible alternate sources of energy for IC Engines
Refrigeration & Air Conditioning (19APE0307)	CO1	Illustrate the fundamental principles and applications of refrigeration and air conditioning system.
	CO2	Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems.
	CO3	Present the properties, applications and environmental issues of different refrigerants
	CO4	Calculate cooling load for air conditioning systems used for various air conditioning systems
	CO5	Operate and analyze the refrigeration and air conditioning systems
Finite Element Analysis (19APE0308)	CO1	Summarize the basics of finite element formulation.
	CO2	Apply finite element formulations to solve one dimensional Problems.
	CO3	Apply finite element formulations to solve two dimensional scalar problems.
	CO4	Apply finite element method to solve two-dimensional Vector problems.
	CO5	Apply finite element method to solve problems on iso parametric element and dynamic Problems.
Computational Fluid Dynamics (19APE0309)	CO1	Provide the student with a significant level of experience in the use of modern CFD software for the analysis of complex fluid-flow systems
	CO2	Apply the various discretization methods, solution procedures and turbulence modeling to solve flow and heat transfer problems
	CO3	Express numerical modeling and its role in the field of fluid flow and heat transfer
	CO4	Illustrate the working concepts of thermal engineering
	CO5	Improve the student's understanding of the basic principles of fluid Mechanics
Power Plant Engineering (19APE0310)	CO1	Discuss the basic terminology and concepts involved in the power generation calculations.
	CO2	Analyze the working and layout of steam power plants and the different systems comprising the plant and discuss about its economic and safety impacts
	CO3	Define the working principle of diesel power plant, its layout, safety principles and compare it with plants of other types
	CO4	Discuss the working principle and basic components of the hydroelectric plants and the economic principles and safety precautions involved with it.
	CO5	Discuss and analyze the working principles of different non-conventional sources involved in the power generation.
Simulation Modelling for Manufacturing Systems (19APE0311)	CO1	Students gain knowledge on various types of simulation andsimulation languages steps in simulation and applications of simulation
	CO2	Students gain knowledge on parameter estimation and hypothesis
	CO3	Students can build simulation model and also can validation and verify model
	CO4	Can Generation of random variants and variables
	CO5	Applications of simulation and systems
	CO1	Study of elements of mechanisms in different geometry.

Advanced Mechanics (19APE0312)	CO2	Study and construction of kinematics of plane motions
	CO3	Design and determination of different mechanisms in advanced kinematics of plane motion.
	CO4	Study and analysis of synthesis graphical method
	CO5	Design of different functions and methods of graphical method and theorems.
Effective Technical Communication (19AHE9906)	CO1	To develop awareness in students of the relevance and importance of technical communication and presentation skills.
	CO2	To prepare the students for placements
	CO3	To sensitize the students to the appropriate use of non-verbal communication
	CO4	To train students to use language appropriately for presentations and interviews
Technical Writing (19AHE9901)	CO1	Acquaint students with a variety of forms of writing in science and technology
	CO2	Develop research skills
	CO3	Discuss and apply writing and formatting techniques
	CO4	Participate actively in writing activities (individually and in collaboration) that model
	CO5	Design the main features of the brochure, content architectural design, filters etc.
Organizational Behaviour (19AHSMB03)	CO1	Understand the nature and concept of Organizational behavior.
	CO2	Familiar with the motivational theories.
	CO3	Able to understand leadership theories and qualities.
	CO4	Learn about group dynamics
Metrology and Measurements Lab (19APC0322)	CO1	Identify techniques to minimize the errors in measurement
	CO2	Identify the methods and devices for measurement of length, angle, gear & thread parameters, surface roughness and geometric features of parts
	CO3	Understand the alignment of machine components in different machine tools.
	CO4	Understand the calibration procedure in measuring different quantities such as temperature, speed and displacement
	CO5	Apply the theoretical knowledge in gear measurement using precision instruments