DEPARTMENT OF MECHANICAL ENGINEERING				
SL. NO.	**SUB. CODE**	**SUBJECT NAME**	**COURSE OUTCOMES**	
1	C101	COMMUNICATIVE ENGLISH	C101.1	Define the role of communication in the present-day world.
			C101.2	Understand the fundamentals of Grammar for error free written communication.
			C101.3	Use basic knowledge in Phonetics and Pronunciation skills for better Communication.
			C101.4	Illustrate the diversified traditions and cultures through interpersonal communication.
			C101.5	Evaluate student's competency through various writing skills.
			C101.6	Develop the confidence to make communication in all the situations with knowledge on soft skills.
2	C103	MATHEMATICS-I	C103.1	Apply the knowledge of calculus, Gamma and Beta functions for analyzing engineering problems.
			C103.2.	Analyze the first order differential equations using standard methods and its application in engineering fields.
			C103.3	Demonstrate various physical models through higher order differential equation
			C103.4	Explain linear differential equations with variation of parameters.
			C103.5	Describe series solution of differential equations and explain application of Bessel's function.
			C103.6	Develop the essential tool of different matrices with matrix algebra and to compute eigen values and

				eigen vectors required for matrix diagonalization process.
3	C106	PHYSICS	C106.1	Solve the classical and wave mechanical problems.
			C106.2	Demonstrate various types of oscillation and their application in various processes
			C106.3	Formulate and solve the engineering problems on electromagnetism.
			C106.4	Correlate the different ideas in solving the problems of classical physics in their parent streams.
			C106.5	Learn physics behind various types of lasers and their characteristics.
			C106.6	Analyze the quantum physics and their importance in engineering platform
4	C130	BASICS OF MECHANICAL ENGINEERING	C130.1	Define the basics of thermodynamics
			C130.2	Understand the knowledge of application of different thermodynamic systems.
			C130.3	Explain the concepts of heat transfer processes, refrigeration and working principle of internal combustion engine
			C130.4	Understand the fundamentals of Robotics
			C130.5	Understand the basics of Mechanical measuring instruments
			C130.6	Understand the mechanism of power transmission through belt, rope, gear, coupling and clutch
5	C109	BASIC ELECTRONICS ENGINEERING	C109.1	Describe the basic concept of Semiconductors and PN junction diode
			C109.2	Understand the working principle and characteristics of Transistor.
			C109.3	Study the basic concept of FET, MOSFET and CMOS inverter.

			C109.4	Classify the OP-AMP with its applications as Integrator, Differentiator & Summing Amplifier
			C109.5	Relate the various Number systems and logic gates.
			C109.6	Study about the basic combinational logic circuits and their implementations.
6	C113	ENGLISH LANGUAGE LAB	C113.1	Explain and facilitate computer-aided multi-media instruction enabling individualized and independent language learning.
			C113.2	Interpret the students to the nuances of English speech sounds, word accent, intonation and rhythm.
			C113.3	Change a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking.
			C113.4	Develop the fluency in spoken English and neutralize mother tongue influence.
			C113.5	Compare the abilities of students with real life situations faced by the students.
			C113.6	Modify students to use language appropriately for interviews, group discussion and public speaking
7	C116	PHYSICS LAB	C116.1	Explain the value of g on various places.
			C116.2	Summarize the elasticity of various materials.
			C116.3	Analyses the characteristics of various diode.
			C116.4	Interpret the law of string.
			C116.5	Determine the wavelength of light.
			C116.6	Illustrate the viscosity of liquid.
8	C136	BASICS OF MECHANICAL	C136.1	Study the fundamental thermodynamics.
			C136.2	Demonstrate pressure measuring instruments of fluid.

		ENGINEERING LAB	C136.3	Study on analytical knowledge about refrigerator and air conditioner.
			C136.4	Demonstrate fundamental knowledge of automobile transmission system.
			C136.5	Understand about the construction and function of gear and gear train.
			C136.6	Understand the working and construction of steam power plant.
9	C138	ENGINEERING GRAPHICS AND DESIGN LAB	C138.1	Develop adequate competence in visualization, interpretation and expression of drawing of engineering parts and objects.
			C138.2	Perform free hand sketching of basic geometrical constructions and multiple views of objects.
			C138.3	Gain knowledge on universally accepted conventions and symbols for their usage in technical drawings.
			C138.4	Draw orthographic projection of lines and plane surfaces.
			C138.5	Draw projection of solids and perform development of surfaces.
			C138.6	Gain knowledge about Computer aided drafting.
10	C119	BASICS OF ELECTRONICS ENGINEERING LAB	C119.1	Demonstrate and explain electronic components and electronic components.
			C119.2	Compute the DC and AC resistance of diode with the help of VI characteristics.
			C119.3	Design of Half Wave and Full Wave Rectifier.
			C119.4	Analysis of positive, negative and biased clipper circuit.
			C119.5	Demonstrate the design of inverting and non inverting amplifiers using the OPAMP.

			C119.6	Extract logic gates and their usage in digital circuits
11	C129	BASICS OF CIVIL ENGINEERING	C129.1	Understand the property, use, advantage and disadvantage of different material used for construction.
			C129.2	Analyse different types of materials will be used for construction, their proportions, different types of test & experiments and importance of quality.
			C129.3	Analyse the importance of surveying, its requirements and applications in civil engineering.
			C129.4	Differentiate the types of soil and its classifications, their properties, strengths and Types of foundations.
			C129.5	Explain the ideas of Irrigation engineering and types of irrigation structures like: canals, siphons, weirs, dams etc.
			C129.6	Learn about construction materials, role of transportation as well as of water and its conservation.
12	C110	BASIC ELECTRICAL ENGINEERING	C110.1	Recognize the circuit elements with their characteristics and solve Electrical engineering circuit problems applying: KCL, KVL, node voltage analysis, mesh current analysis, super position theorem and maximum power transfer theorem.
			C110.2	Analyze the ac circuits having Resistive, Inductive and Capacitive load in the presence of sinusoidal excitation along with resonance condition.
			C110.3	Evaluate the transient and steady state response of various electrical circuits.
			C110.4	Understand the generation and distribution of ac power and simultaneously can apply to solve the problems relating to complex powers of single phase and three phase AC circuits.

			C110.5	Differentiate the relationship between the Magnetic and Electric circuits.
			C110.6	Explain and generalize the construction, principle of operation and the relating governing equations of electric machines like: DC Generator, DC Motor Induction Motors and Alternators
13	C111	ENGINEERING MECHANICS	C111.1	Analyze a system of forces acting on a rigid body.
			C111.2	Apply the knowledge of parallel forces in determining the centroid and second moment of area of plain figures.
			C111.3	Analyze planar and spatial systems to determine the forces in members of trusses and frames.
			C111.4	Acquire the knowledge of space-time relationship of a body in motion and calculate the motion parameters under external forces.
			C111.5	Apply the knowledge to analyze the motion of a body under curvilininer motion.
			C111.6	Study the motion of a rotational body under external forces.
14	C105	CHEMISTRY	C105.1	Understand the basics of quantum mechanical concept.
			C105.2	Apply the principles of spectroscopy in predicting absorption and relative terms in diatomic molecule.
			C105.3	Evaluate the phase diagram of some one and two component systems by applying Phase Rule.
			C105.4	Classify the organometallics.
			C105.5	Analyse the quantitative aspects of fuel combustion by understanding the fundamental concepts of fuels.
			C105.6	Evaluate the corrosion of a material by using the fundamental concepts of corrosion chemistry

15	C104	MATHEMATICS-II	C104.1	Apply the knowledge of Laplace transformation and its use in getting solution to differential equations.
			C104.2	Use of periodic functions and Fourier series, Fourier integral
			C104.3	Describe Fourier transform to analyze circuit and system communication.
			C104.4	Illustrate the concept of vector differential calculus to understand the solenoidal and irrotational vectors
			C104.5	Illustrate the concept of tangent and arc length, gradient.
			C104.6	Solve the Vector differential and integral calculus problem.
16	C107	PROGRAMMING FOR PROBLEM SOLVING USING C	C107.1	Illustrate the flowchart and design an algorithm for a given problem and write a C Program
			C107.2	Develop conditional and iterative statement to write c Program
			C107.3	Exercise user defined functions to solve real-time problems
			C107.4	Inscribe C programs that use pointers to access arrays, pointers and strings
			C107.5	Exercise user defined data types including structures and unions to solve problems
			C107.6	Exercise files concept to show input output of the file in C
17	C117	PROGRAMMING FOR PROBLEM SOLVING	C117.1	Understand the basics of Electrical Laws which can be applied for solving electrical Circuits.
			C117.2	Interpret and explain DC and AC circuits.
			C117.3	Analyses Three phase circuits.
			C117.4	Understand elementary idea of Magnetic Circuits.

		USING C LAB	C117.5	Classify various electrical Machines.
			C117.6	Gain knowledge about the different Electrical Machines.
18	C121	WORKSHOP	C121.1	Get a good knowledge and experience about the working conditions at shop floor level.
			C121.2	Practice on fabrication of components through various operations in fitting and welding.
			C121.3	Identify and apply suitable tools for various operations in lathe machine.
			C121.4	Get the knowledge of working in machine shop such as milling machine, shaper etc.
			C121.5	Study and practice on machine tools and their operations
			C121.6	Acquire the Knowledge about safety in workshop and industry.
19	C115	CHEMISTRY LAB	C115.1	Determine the amount of a compound / ion present in a given mixture / compound.
			C115.2	Understand the Iodometric titrations.
			C115.3	Analyse water sample to know some of its characteristics.
			C115.4	Evaluate the suitability of a lubricant/fuel by determining some general property.
			C115.5	Create a drug.
			C115.6	Apply the knowledge gained to determine the strength of a solution.
20	C133	BASICS OF CIVIL ENGINEERING LAB	C133.1	Determine the shape, size and Compressive strength of brick.
			C133.2	Learn the testing of chain and measurement of correct length of the line, Bearing of a line.

			C133.3	Know the importance of total station and its application.
			C133.4	Determine Setting time of cement
			C133.5	Evaluate the tensile strength of reinforcing steel.
			C133.6	Calculate Compressive strength of concrete.
21	C120	BASIC ELECTRICAL ENGINEERING LAB	C120.1	Understand the basics of Electrical Laws which can be applied for solving electrical Circuits.
			C120.2	Interpret and explain DC and AC circuits.
			C120.3	Analyses Three phase circuits.
			C120.4	Understand elementary idea of Magnetic Circuits.
			C120.5	Classify various electrical Machines.
			C120.6	Gain knowledge about the different Electrical Machines.
22	C203	ENGINEERING ECONOMICS	C203.1	Define the basic concept of micro and macroeconomics, engineering economics and their application in engineering economy.
			C203.2	Understand the law of demand and law of supply.
			C203.3	Understand the environment and financial systems of the country and its impact on business, society and enterprise.
			C203.4	Analyze time value of money using engineering economy factors.
			C203.5	Gain knowledge of economics and engineering principles to solve engineering problems and to evaluate engineering projects considering upon depreciation, taxes and inflation.
			C203.6	Apply depreciation methods for individual/industrial/ public alternatives

23	C207	MECHANICS OF SOLIDS	C207.1	Explain the fundamental concepts of rigid and deformable solids in the perspective of stress, strain and modulus of elasticity.
			C207.1	Apply the principles of bi-axial state of stresses in various problems, analysis of thin cylinder.
			C207.3	Calculate the loads in beams, shear forces and bending moments associated with different sections.
			C207.4	Illustrate the theory, principles associated to torsion in solid, hollow shafts, helical springs.
			C207.5	Evaluation of deflection in beams by using by different methods.
			C207.6	Analysis of different columns under different end conditions.
24	C230	OBJECT ORIENTED PROGRAMMING USING JAVA	C230.1	List and use various Object Oriented Programming concepts for problem solving.
			C230.2	Describe various fundamental tokens as well as linear data structure using object oriented programming.
			C230.3	Solve problems on string and inheritance by applying different library function.
			C230.4	Analyze and Design program based on concept of multithreading and abstraction
			C230.5	Evaluate various GUI component using Applet and AWT to solve real world problem.
			C230.6	Design &Create various application based on swing by using java fx.
25	C209	FLUID MECHANICS AND HYDRAUL	C209.1	State and explain various fluid properties in rest and in transit.
			C209.2	Understand concepts related to fluid statics.

		IC MACHINES	C209.3	Apply the concepts of fluid kinematics to various types of fluid flow and flow lines also determine various flow parameters.
			C209.4	Apply conservation laws to fluid flow problems in engineering applications.
			C209.5	Analyses the fluid flow problems like flow through pipes, ducts and nozzles.
			C209.6	Evaluate performance parameters of hydraulic machines like turbines and pumps.
26	C201	MATHEMATICS - III	C201.1	Identify, formulate formula and analyze complex engineering problems and they can solve it.
			C201.2	Understand the processes of Interpolation of a polynomial by Lagrange, Newton divided, forward and backward difference.
			C201.3	Gain knowledge to analyze and formulate the formula to compare the exact and approximate value of an integral by different rules.
			C201.4	Solve an ordinary differential equation and a system of ordinary differential equations by using numerical Methods and extract the value of variables.
			C201.5	Evaluate the probabilistic problems by defining the probability formula and use them to solve Probability problems.
			C201.6	Gain knowledge about the Statistical hypothesis and analyze the regression and related them into estimate
27	C221	MECHANICS OF SOLIDS LAB	C221.1	Compute the tensile strength and compressive strength of the specimen using UTM.
			C221.2	Compute bending stress and shear modulus of rigidity of the given specimen using UTM
			C221.3	Determine rigidity modulus and fatigue strength of the given specimen.

			C221.4	Determine spring constants under tension and compression.
			C221.5	Measure load using load indicator and load cell
			C221.6	Perform strain measurements using strain gauge and stress measurement using strain rosettes.
28	C222	FLUID MECHANICS AND HYDRAULIC MACHINES LAB	C222.1	Determine stability of floating bodies.
			C222.2	Determine flow coefficients of flow measuring devices.
			C222.3	Analyze flow patterns occurring in pipe.
			C222.4	Calculate force acting on vanes by using momentum conservation principle.
			C222.5	Calculate head loss occurring in a pipe network.
			C222.6	Evaluate performance parameters of turbines and pumps.
29	C223	OBJECT ORIENTED PROGRAMMING USING JAVA LAB	C223.1	To Understand OOP concepts and basics of Java programming.
			C223.2	To create Java programs using inheritance and polymorphism.
			C223.3	To Implement error-handling techniques using exception handling and multi threading database connection.
			C223.4	To differentiate various collections.
			C223.5	To build files and establish database connection.
			C223.6	To develop GUI using Swing components.
30	C210	KINEMATICS & DYNAMICS OF	C210.1	Understand various mechanisms, which can be used under different situations in different machines.
			C210.2	Analyze and plot displacement, velocity and acceleration of different components of machines.

		MACHINES	C210.3	Study of different mechanisms of gears and gear trains.
			C210.4	Analyze and decide the type of drives to be used for different machinery applications.
			C210.5	Determination of power for different clutches
			C210.6	Evaluate the force analysis and power calculation of brakes & dynamometers.
31	C208	INTRODUCTION TO PHYSICAL METALLURGY AND ENGINEERING MATERIAL	C208.1	Understand how materials are formed and their classification based on atomic arrangement.
			C208.2	Describe the mechanical behavior of metallic systems and testing methods of materials.
			C208.3	Acquire acquaintance with types of fracture and failure and methods of protection against the fractures.
			C208.4	Know about the phase transformation of material.
			C208.5	Understand different optical properties of Materials and description about plastics, ceramics and composite materials.
			C208.6	Gain knowledge in various class of materials and their applications
32	C211	ENGINEERING THERMODYNAMICS	C211.1	Demonstrate an understanding of the concepts of first law of thermodynamics to identify closed and open systems.
			C211.2	Apply the concept of second law to understand fundamental concepts of unsteady Flow, Entropy Generation and Property relations
			C211.3	Develop a fundamental understanding of Reversible work, Exergy balance and Second Law Efficiency applied to various real life applications.

			C211.4	Analyze the performance of gas and vapor power cycles and identify methods to improve thermodynamic performance.
			C211.5	Solve problems based on the Brayton cycle; the Brayton cycle with regeneration; and the Brayton cycle with intercooling, reheating, and regeneration.
			C211.6	Explain working principle of air compressors and their applications in engineering industry.
33	C220	MECHANICAL MEASUREMENT, METROLOGY AND RELIABILITY	C220.1	Identify and select suitable instruments for measuring parameters of mechanical systems and design and develop feedback control systems for different engineering applications.
			C220.2	Understand the concept of experimental stress analysis on different mechanical components.
			C220.3	Measure mechanical parameters such as displacement, force, torque, speed and vibration using suitable instruments and measure temperature, pressure and flow with suitable instruments as required in different engineering applications
			C220.4	Explain different terminologies of screw thread, gears and its measurement methods.
			C220.5	Understand standards of measurement, methods to determine geometry and surface finish as well as dimensions of industrial components and design Go and No Go gauges based on principles of limits, fits and tolerance.
			C220.6	Analyze reliability data and predict reliability of individual components and select and design an acceptance sampling plan for sampling inspection.
34	C233		C233.1	Apply basic knowledge of Boolean algebra, basic gates, logic circuits.

		DIGITAL SYSTEMS DESIGN	C233.2	Implement and analyse different combinational circuits such as adders, substractors, decoders, encoders, multiplexers, and de-multiplexers.
			C233.3	Implement and analyse different flip-flops with a basic knowledge about state diagrams.
			C233.4	Implement and analyse different counters and registers with a basic knowledge about flip-flops.
			C233.5	Analyse different memories, programmable logic arrays, programmable logic arrays, and sequential programmable devices.
			C233.6	Apply basic knowledge about logic gates to implement circuits using different logic families, ADC, and DAC.
35	C204	ORGANISATIONAL BEHAVIOUR	C204.1	Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.
			C204.2	Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.
			C204.3	Analyze the complexities associated with management of the group behavior in the organization.
			C204.4	Demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.
			C204.5	Evaluate the impact of different cultures within an organization
			C204.6	Develop a new technique to implement organizational change for the achievement of organizational goal.
36	C223	KINEMATICS &	C223.1	Determination of radius of gyration of compound pendulum and connecting rod.

		DYNAMICS OF MACHINES LAB	C223.2	Study of different clutches and brakes.
			C223.3	Determination of power by different dynamometers.
			C223.4	Demonstrate journal bearing apparatus
			C223.5	Study of different gear trains.
			C223.6	Evaluation of Coriolis component of acceleration.
37	C224	ENGINEERING THERMODYNAMICS LAB	C224.1	Study of Cut-Sections of 2 stroke and 4 stroke Diesel Engine and Petrol engine
			C224.2	Study of steam power plant, gas turbine power plant and refrigeration system
			C224.3	Study of refrigeration system
			C224.4	Perform analysis of reciprocating air-compressor.
			C224.5	Perform analysis of Centrifugal / Axial Flow compressor.
			C224.6	Determine performance characteristics of gear pump
38	C234	INTRO. TO PHYSICAL METALLURGY AND ENGINEERING MATERIAL LAB	C234.1	Study of crystal structures through ball models
			C234.2	Study the principles and operations of metallurgical microscope
			C234.3	Prepare specimen technique for metallographic analysis
			C234.4	Do micro structural analysis of carbon steels, cast iron and non-ferrous metals such as brass & copper
			C234.5	Perform heat treatment of steel materials
			C234.6	Perform hardness testing of ferrous material and Charpy/Izod impact testing
39	C310	HEAT TRANSFER	C310.1	Gain knowledge about the principles and mechanism of heat transfer in solids and fluids and solve problems on conduction, convection and radiation heat transfer.

			C310.2	Analyze the mechanism of heat transfer through conduction mode and apply the knowledge of conduction heat transfer in designing of various heat transfer systems for industrial applications.
			C310.3	Understand the mechanism of forced and free convection in fluids and apply the knowledge of convection heat transfer for evaluation of heat transfer coefficients in case of natural convection and forced convection over surfaces and inside .4ducts.
			C310.4	Illustrate the real time applications of radiation mode of heat transfer.
			C310.5	Comprehend the phenomena of heat transfer in boiling liquids and condensing Vapours and apply the knowledge in solving problems related to the industrial applications.
			C310.6	Analyze the performance and develop the design skills of heat exchangers.
40	C212	BASIC MANUFACTURING PROCESSES	C212.1	Select materials, types and allowances of patterns used in casting and analyze the foundry components.
			C212.2	Study different arc, gas, solid state and resistance welding processes.
			C212.3	Understand various non destructive testing methods.
			C212.4	Describe different powder metallurgy processes.
			C212.5	Develop process-maps for metal forming processes using plasticity principles.
			C212.6	Explain various coating and deposition methods.
41	C214	MECHANISM & MACHINES	C214.1	Understand different mechanisms of lower pairs, higher pairs and construct diagram of different mechanisms.
			C214.2	Interpret dynamic analysis of flywheel for engines as well as for different machines.

			C214.3	Explain dynamic force analysis of gear mechanism.
			C214.4	Develop concepts of speed control systems for engines, and gyro-stabilizers for ships and aeroplanes.
			C214.5	Develop knowledge of analytical and graphical methods for calculating balancing of rotary and reciprocating masses.
			C214.6	Develop understanding of vibrations and its significance on engineering design.
42	C307	AUTOMOBILE ENGINEERING	C307.1	Analyze the basic concepts and working principles of various automobile components.
			C307.2	Distinguish between various types of transmissions systems, and rear axles.
			C307.3	Explain the need of various conventional and automatic steering and braking systems.
			C307.4	Understand the principles of different gear boxes and tyre geometry.
			C307.5	Understand automotive electronics.
			C307.6	Study latest developments in automobiles.
43	C333	RAPID MANUFACTURING PROCESS	C333.1	Understand the development and applications of RP, Classification of manufacturing processes, Different manufacturing systems
			C333.2	Understand the need of RP in context to different advanced manufacturing systems, and gain the knowledge of basic principles and steps in RP, different types of Rapid prototyping processes and reverse engineering.
			C333.3	Understand different Rapid Manufacturing Process Optimization like factors influencing accuracy, Data preparation errors, Part building errors, Error in finishing, influence of build orientation.

			C333.4	Describe different RP techniques based on raw materials, layering technique and energy sources and different process technology such as stereo lithography, SLS, SPB, BPM and FDM etc.
			C333.5	Describe different RP techniques such as LOM, SGC, BIS, HIS etc.
			C333.6	Acquire the knowledge of special topic on RP modelling, Slicing, Internal Hatching, Surface skin films, support structure and know various Software for RP and Collaboration tools
44	C228	BASIC MANUFACTURING PROCESSES LAB	C228.1	Test the properties of mouldings sands.
			C228.2	Study on different foundry practices.
			C228.3	Determine strength of brazed and soldered joints.
			C228.4	Fabricate joints using different welding practices.
			C228.5	Perform different sheet metal operations.
			C228.6	Perform different forming processes.
45	C324	HEAT TRANSFER LAB	C324.1	Analysis of heat transfer by conduction in various commonly used materials.
			C324.2	Measurement of the fin performance under natural/ forced convection.
			C324.3	Measure the amount of heat transfer taking place between fluids flowing within heat exchangers.
			C324.4	Aanalyze free and forced convection phenomenon.
			C324.5	Demonstrate the concept of pool boiling.
			C324.6	Demonstrate fundamental concepts of radiative heat transfer.
46	C225	MECHANISM &	C225.1	Determination of gyroscopic couple using gyroscopic test rig and performance of spring loaded governor.

		MACHINES LAB	C225.2	Determination of critical speed of rotating shaft.
			C225.3	Perform static and dynamic balancing.
			C225.4	Determination of natural frequencies of un-damped as well as damped vibrating systems.
			C225.5	Study of interference and undercutting for gear drives
			C225.6	Study of various cam and follower mechanisms.
47	C320	MACHINING SCIENCE AND TECHNOLOGY	C320.1	Understand various tool geometries, their inter-relations and theories involved in metal cutting.
			C320.2	Evaluate various machining parameters used in conventional machining processes.
			C320.3	Apply concepts of kinematics in various machining processes to determine kinematic parameters.
			C320.4	Explain mechanisms, of various conventional machining processes along with work and tool holding devices.
			C320.5	Understand construction and working principle of various production machine tools.
			C320.6	Understand the working principles, applications and importance of modern machining processes over conventional machining processes.
48	C302	OPTIMIZATION IN ENGINEERING	C302.1	Aanalyze the real life systems with limited constraints
			C302.2	Depict the systems in a mathematical model form
			C302.3	Apply knowledge of optimization to formulate and solve engineering problems.
			C302.4	apply the theory of optimization methods and algorithms to develop and for solving various types of optimization problems

			C302.5	solve the mathematical results and numerical techniques of optimization theory to concrete Engineering problems by using computer software
			C302.6	Understand variety of real industrial problems such as resource allocation, production planning, assignment, transportation, travelling salesman etc. and solve these problems using linear programming approach using software
49	C306	DESIGN OF MACHINE ELEMENTS	C306.1	Explain basic concepts and principles in the design of machine elements & apply them effectively from material selection to design analysis
			C306.2	Interpret standardized data by using design data book to analyze life of components under various loading conditions..
			C306.3	Explain and design permanent and temporary joints under various loading conditions.
			C306.4	Design and analyze couplings and power transmission shafts for different conditions
			C306.5	Design helical compression spring and laminated spring
			C306.6	Analyze operating conditions of Journal bearings, and use manufacturer's catalogue for selection of rolling contact bearings.
50	C336	ELECTRICAL ENERGY CONSERVATION AND AUDITING	C336.1	Understand energy scenario and policy
			C336.2	Understand the significance and procedure for energy conservation and audit
			C336.3	Understand causes and remedies for global energy issues
			C336.4	Analyze, calculate and improve the energy efficiency and performance of electrical utilities
			C336.5	Analyze, calculate and improve the energy efficiency and performance of mechanical utilities

			C336.6	Understand the applications of Internet of Things (IoT) in the energy sector
51	C335	COMPRESSIBLE FLOW AND GAS DYNAMICS	C335.1	Derive governing equations of compressible fluid flow
			C335.2	Analyze one dimensional compressible flow through variable area duct
			C335.3	Analyze compressible flow having normal shock.
			C335.4	Apply governing equations to compressible flow through constant area duct with friction.
			C335.5	Apply governing equations to compressible flow through constant area duct with heat transfer
			C335.6	Apply one-dimensional and quasi-one-dimensional flows in typical engineering applications
52	C412	SEMINAR-I	C412.1	Select topics on modern technology, prepare slides for power point presentation
			C412.2	Gain good knowledge on modern technology by referring the journals/magazines
			C412.3	Improvement in presentation skill viz. clarity of voice, proper body language, interaction with audience.
			C412.4	Development of communication skills.
			C412.5	Improve in demonstration knowledge, skills and in development of attitudes of a professional engineer.
			C412.6	Learn to compile a detail report about presentation in the prescribed format.
53	C325	MACHINING SCIENCE AND TECHNOLOGY LAB	C325.1	Perform various operations in lathe machine.
			C325.2	Perform various operations in shaper, planner and grinding machine.
			C325.3	Evaluate cutting force by using lathe tool dynamometer.

			C325.4	Evaluate cutting force by using lathe drill dynamometer.
			C325.5	Study various non conventional machining methods.
			C325.6	Prepare jobs by using CNC machine.
54	C326	DESIGN OF MACHINE ELEMENTS LAB	C326.1	Design and make any working model from cotter and knuckle joint and another working model from shaft, spring and bearing.
			C326.2	Design and draw a riveted joint, cotter joint and knuckle joint using either Auto-cad/Pro-E/Catia/Ansys
			C326.3	Design and analyze shafts subjected to combined loading using either Auto-cad/Pro-E/Catia/Ansys
			C326.4	Design and draw flange coupling using either Auto-cad /Pro-E/Catia/Ansys
			C326.5	Design of spring using either Auto-cad/Pro-E /Catia/ Ansys
			C326.6	Design of bearing using either Auto-cad/Pro-E /Catia/ Ansys
55	C410	POWER PLANT ENGINEERING	C410.1	Describe the working of different types power plants based on fuels and site selection criteria for each of them.
			C410.2	Analyze the working and layout of steam power plants and the different systems comprising the plant.
			C410.3	Evaluate performance parameters of impulse turbine and other components.
			C410.4	Analyze reaction turbines, condensers and circulating system.
			C410.5	Describe the working principle and basic components of the nuclear power plant and the economic and safety principles involved with it.

			C410.6	Understand power plant economics and its implications on power generating units.
56	C419	INTELLECTUAL PROPERTY RIGHTS	C419.1	Recognize the fundamental of intellectual property Rights, Types, Need & importance of IPR.
			C419.2	Understand the Registration Process of different IPs, legal and practical steps needed to ensure the different intellectual property rights remain valid and enforceable.
			C419.3	Review ownership rights and marketing protection under intellectual property law as applicable to information, ideas
			C419.4	Able to learn new products and product marketing to maintain Trade secret.
			C419.5	Analyze the current and emerging issues relating to the intellectual property protection, GI, Unfair competition
			C419.6	Development and reform of intellectual property rights and their likely impact on creativity and innovation.
57	C423	MICRO ELECTRONIC MECHANICAL SYSTEMS	C423.1	Investigate about basics of MEMS and microsystems.
			C423.2	Apply knowledge about basics of MEMS to investigate about different micromachining techniques.
			C423.3	Investigate about mechanics of deformable bodies and energy method.
			C423.4	Design and model a electromechanical system and estimate the stiffness and damping of different micro-structures.
			C423.5	Design different MEMS applications such as mechanical sensors and actuators.

			C423.6	Apply the basics knowledge about MEMS to investigate about optical and radio-frequency MEMS.
57	C406	MECHANICAL VIBRATION	C406.1	Model & analyze single DoF systems: undamped & damped free vibrations, forced vibrations
			C406.2	Use vibration measuring instruments for vibration analysis.
			C406.3	Model & analyze two DoF systems without damping: amplitude and modes of vibration.
			C406.4	Model & analyze multi DoF systems without damping using different theoretical techniques
			C406.5	Analyze continuous systems for their amplitude of vibration and mode shapes for various boundary conditions
			C406.6	Explain noise, its measurement & noise reduction techniques for industry and day today life problems
58	C401	ENTERPRENEURSHIP DEVELOPMENT	C401.1	Communicate effectively both orally and in writing.
			C401.2	Demonstrate knowledge of the legal and ethical environment impacting business organizations and exhibit an understanding and appreciation of the ethical implications of decisions.
			C401.3	Demonstrate an understanding of and appreciation for the importance of the impact of globalization and diversity in modern organizations.
			C401.4	Demonstrate an ability to engage in critical thinking by analyzing situations and constructing and selecting viable solutions to solve problems.
			C401.5	Demonstrate an ability to work effectively with others.
			C401.6	Demonstrate knowledge of current information, theories and models, and techniques and practices in all of the major business disciplines including the

				general areas of Accounting and Finance, Information Technologies, Management, Marketing, and Quantitative Analysis.
59	C424	INDUSTRIAL SAFETY ENGINEERING	C424.1	Describe different types of accidents and hazards, Describe salient points of Factories act 1948 for health, and safety, Describe Fire prevention and fire fighting, equipment and methods.
			C424.2	Appreciate the need of maintenance in industry, Describe functions of maintenance department,. Calculate service life of equipment
			C424.3	Explain causes, effects and reduction methods of wear, Select appropriate lubricants and lubrication method.
			C424.4	Describe reasons of corrosion for given case, Explain methods of corrosion prevention
			C424.5	Develop decision trees to diagnose faults in equipment
			C424.6	Carry out periodic inspection in mechanical systems, Overhaul of mechanical components and electrical motor, Plan preventive maintenance of major mechanical systems
60	C412	SEMINAR-II	C412.1	Gain good knowledge on modern technology by referring the journals/magazines
			C412.2	Improvement in presentation skill viz. clarity of voice, proper body language, interaction with audience.
			C412.3	Development of communication skills.
			C412.4	Improve in demonstration knowledge, skills and in development of attitudes of a professional engineer.
			C412.5	Learn to compile a detail report about presentation in the prescribed format
			C412.6	Prepare slides for power point presentation

61	C413	MINOR PROJECT	C413.1	Identify & undertake projects which are feasible, cost effective, eco-friendly and safe.
			C413.2	Analyze the relation of the project to the literature and how much the project is applicable to the society.
			C413.3	Plan properly to complete the project within the schedule time.
			C413.4	Conduct all relevant testings after execution of the project and analyze the test results for future research.
			C413.5	Compile project report as per standard norm.
			C413.6	Prepare slides for power point presentation
62	C417	COMPREHENSIVE VIVA VOCE	C417.1	Demonstrate the understanding of engineering knowledge learnt in four year graduation course.
			C417.2	Defend any type of interviews, viva-voce, and aptitude tests both at the academic and the industry sector.
			C417.3	Perform well in group discussions and enhance the communications skills and interaction.
			C417.4	Apply knowledge in developing their career in particular fields.
			C417.5	Apply the principles and phenomena, and their applications in solving engineering problems.
			C417.6	Exhibit professional etiquette suitable for career progression
63	C415	INTERNSHIP / MAJOR PROJECT	C415.1	Identify & undertake projects which are feasible, cost effective, eco-friendly and safe.
			C415.2	Analyze the relation of the project to the literature and how much the project is applicable to the society.
			C415.3	Plan properly to complete the project within the schedule time.

			C415.4	Conduct all relevant testings after execution of the project and analyze the test results for future research.
			C415.5	Execute any project with proper methodology and in a team spirit.
			C415.6	Develop confidence for self-education and ability for lifelong learning