

Year Branch	Course Code	Course Name	Course Objectives	Course Out Come's
I/IV MECH I Sem	ME-111	ENGINEERING GRAPHICS	<p>PO 1: Projections of points and straight lines-I</p> <p>PO 2: Projections of straight lines-II and planes.</p> <p>PO 3: Projections of solids and sections of solids</p> <p>PO 4: Isometric and Orthographic projections.</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Understand the importance of codes from BIS and ISO Standards in Engineering Drafting.</p> <p>CO 2: Construct graphically and understand the importance of basic mathematical curves in Engineering applications</p> <p>CO 3: Visualize and Demonstrate various geometrical structures (i.e. points, lines, planes and solids) through Orthographic Projections.</p> <p>CO 4: Prepare and interpret the orthographic and Isometric views of various solids.</p> <p>CO 5: Draw and develop the sectional views, surfaces of geometrical solids and projections of intersecting solids.</p> <p>CO 6: Confident in preparing 2D and 3D drawings using CAD</p>
I/IV MECH I Sem	CE-111	ENGINEERING MECHANICS	<p>PO 1: Develop concept of force, reactions, principles of force and their application on engineering structures and machines</p> <p>PO 2: Introduce various kinds of statically determinate pin jointed structures and methods of analysing the trusses.</p> <p>PO 3: Understand the importance of geometric centre, cross sectional areas of plane lamina and moment of inertia</p> <p>PO 4: Understand the behavior of particles in motion subjected to system of forces.</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO1: Represent the force, moments for drawing free-body diagrams and analyze friction based systems in static condition.</p> <p>CO 2: understand the mechanics involved in pin jointed structures the trusses..</p> <p>CO 3: To locate the centroid of an area and calculate the moment of inertia of a section.</p> <p>CO 4: Apply of conservation of momentum & energy principle for particle dynamics and rigid body kinetics</p>

I/IV MECH II Sem	ME-121	Engineering Workshop	<p>PO 1: The workshop practice in first year common to all branches of engineering at degree level.</p> <p>PO 2: To gain a good basic working knowledge required for the production of various engineering products.</p> <p>PO 3: It is intended to impart basic knowledge of hand tools and instruments their uses in different sections.</p> <p>PO 4: They include carpentry, fitting, plumbing, welding, electrical house wiring and foundry.</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Study and practice on various tools and instruments using in workshop carpentry, fitting, plumbing, welding, house wiring and foundry.</p> <p>CO 2: The students will able to perform in carpentry, half lap joint, bridle Joint, mortise and tenon joint etc.</p> <p>CO 3: The students willable to perform square fit, half round fit and dove tail fit.</p> <p>CO 4: The students willable to perform in plumbing shop using of coupling, nipple, elbow, plug, tee, reducer, union, tap and etc..</p> <p>CO 4: The students will able to perform the welding process to make butt joint, Lap Joint, and T-lap joint.</p> <p>CO 5: The students will able to perform electrical house wiring to prepare Parallel & Series, Two-way Switch and Tube Light.</p> <p>CO 6: The students will able to preparation of green sand mould using single piece and split pattern.</p>
II/IV MECH I Sem	ME-21	Thermodynamics	<p>PO 1: To understand the basic concepts of thermodynamic laws and cycles.</p> <p>PO 2: To understand the first law of thermodynamics for open and closed systems and its applications.</p> <p>PO 3: To understand the second law of thermodynamics, gas laws and concepts of entropy principle.</p> <p>PO 4: To understand the concepts of pure substances, properties of steam, property diagrams and power plant cycles.</p> <p>PO 5: To study the properties of moist air, psychometric charts, air conditioning and thermodynamic analysis of gas mixtures.</p>	<p>Course Outcomes: Upon Completion of this course the students are able to:</p> <p>CO 1: Explain the Basic Terminology of Thermodynamics like Systems, Ideal gases and Other vocabulary of thermodynamics.</p> <p>CO 2: Understand the SFEE and USFEE, application of first law of thermodynamics to open and closed systems. And solve the problems related to open and closed systems.</p> <p>CO 3: Understand the concept of second law of thermodynamics, entropy and exergy,energy and solve the problems related to second law of thermodynamics.</p>

				<p>CO 4: Acquiring the knowledge of pure substances, properties of steam, properties diagrams and solve the problems related to power plant cycles.</p> <p>CO 7: Understand the behavior of gas mixtures, working of air conditioning system and calculating performance parameters using psychometric chart.</p>
II/IV MECH I Sem	ME-212	Mechanics of solids	<p>CO 1: To understand the basic concepts of stress, strain and their relations based on linear elasticity</p> <p>CO 2: To learn & compute shear stresses and bending moments in beams</p> <p>CO 3: To determine the bending stress distribution and shear stress distribution in beams</p> <p>CO 4: To formulate the deflection and slope equations of beams, evaluate stresses and strains of circular members subjected to torsion</p> <p>CO 5: To understand the importance of pressure vessels</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>PO 1: Apply the fundamental concepts of stress and strain in the analysis and design of axially loaded bars. Material behaviors due to different types of loading will be discussed.</p> <p>PO 2: Evaluate shear forces and bending moments in beams Learn the concept of pure bending theory and determine the bending stresses & shear stresses in beams</p> <p>PO 3: Study the concepts of Pure torsion theory and its applications, analyze deflections of different types of beams under varying loading conditions</p> <p>PO 4: Derive the equations of circumferential & longitudinal stresses in thin cylinders and Lamé's equation for thick cylinders</p>
II/IV MECH I Sem	ME-213	Material Science & Metallurgy	<p>PO 1: Provide basic foundation on crystal structure, imperfections in solids</p> <p>PO 2: To demonstrate the knowledge of structure property relationship</p> <p>PO 3: To make students familiar with different types of phase diagrams</p> <p>PO 4: To understand types of heat treatment process</p> <p>PO 5: Gaining the knowledge on effect of alloying elements on steel and cast iron</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Identify crystal structures for various materials and understand various failures in metals like fracture, creep and fatigue.</p> <p>CO 2: Acquire knowledge to tailor material properties of ferrous and non-ferrous alloys</p> <p>CO 3: Differentiate the properties and applications of ceramics, polymers and composites.</p> <p>CO 4: Design various heat treatments to produce specific microstructure and properties for steels using time- temperature-transformation and continuous cooling diagrams as needed.</p>

II/IV MECH I Sem	ME-214	Manufacturing Science	<p>CO 1: To understand the fundamental science involved in various casting processes.</p> <p>CO 2: To understand the principle of high energy rate forming processes</p> <p>CO 3: To familiarize the load estimations in sheet metal operations.</p> <p>CO 4: To understand the basics of powder metallurgy process.</p> <p>CO 5: To understand the basic concepts of various welding processes.</p>	<p>Upon successful completion of this course, the student will be able to..</p> <p>PO 1: To select appropriate design of gating systems, effective moulding technique, and metal working processes in order to create the products as efficiently as possible.</p> <p>PO 2: Ability to control the process parameters in modern casting processes and to identify the possible defects so as to eliminate them.</p> <p>PO 3: To estimate the forces involved in the various sheet metal operations.</p> <p>PO 4: To analyze problems on forging, rolling, drawing meet industrial needs.</p> <p>PO 5: Able to select appropriate welding process to join various metals to meet industrial needs.</p>
II/IV MECH I Sem	ME-215L	Material Science & Metallurgy Lab	<p>This Laboratory course will develop students' knowledge in/on...</p> <p>CO 1: Microstructures of metals and non-metals</p> <p>CO 2: Testing of engineering materials.</p> <p>CO 3: The hardness of materials by conducting the hardness tests</p> <p>CO 4: The stiffness and rigidity modulus by conducting compression test on spring, torsion test on shaft.</p> <p>CO 5: Mechanical properties of engineering materials</p>	<p>Upon successful completion of this course, the student will be able to..</p> <p>PO 1: Acquire experimentation skills in the field of material testing.</p> <p>PO 2: Identify different metals and alloys based on metallurgical phases observed in the micro structure</p> <p>PO 3: Apply various testing methods for hardness tests</p> <p>PO 4: Estimate the stiffness and rigidity modulus by conducting compression test on spring</p> <p>PO 5: Draw stress strain diagram</p>
II/IV MECH I Sem	ME-216L	Manufacturing Science Lab	<p>PO 1: To understand the science behind the preparation of sand mould, casting process.</p> <p>PO 2: To learn about different welding processes like Gas and ARC welding. To know the forming process.</p> <p>PO 3: To understand the influence various properties on moulding sand.</p>	<p>Upon successful completion of this course, the student will be able to..</p> <p>CO 1: Able to get the basic knowledge to make use of various tools in foundry and welding processes to produce the products.</p> <p>CO 2: Ability to conduct various tests to identify the proper composition and properties of molding sands.</p>

			<p>PO 4: To understand knowledge to make use of various tools, techniques of foundry.</p> <p>PO 5: To acquire the practical hands on experience welding in order to produce components</p>	<p>CO 3: Able to design the moulds of simple objects like flange, dumble, pulley etc. with the aid of foundry tools.</p> <p>CO 4: Ability to perform the welding process to make butt joint, Lap Joint, corner joint etc. with the help of appropriate parameters for improvement of weld quality</p>
II/IV MECH II Sem	ME-220	Thermal Engineering	<p>PO 1: To understand the basic concepts of thermodynamic laws and cycles.</p> <p>PO 2: To understand the first law of thermodynamics for open and closed systems and its applications.</p> <p>PO 3: To understand the second law of thermodynamics, gas laws and concepts of entropy principle.</p> <p>PO 4: To understand the concepts of pure substances, properties of steam, property diagrams and power plant cycles.</p> <p>PO 5: To study the properties of moist air, psychometric charts, air conditioning and thermodynamic analysis of gas mixtures.</p>	<p>Upon successful completion of this course, the student will be able to..</p> <p>CO 1: Explain the Basic Terminology of Thermodynamics like Systems, Ideal gases and Other vocabulary of thermodynamics.</p> <p>CO 2: Understand the SFEE and USFEE, application of first law of thermodynamics to open and closed systems. And solve the problems related to open and closed systems.</p> <p>CO 3: Understand the concept of second law of thermodynamics, entropy and exergy, energy and solve the problems related to second law of thermodynamics.</p> <p>CO 4: Acquiring the knowledge of pure substances, properties of steam, properties diagrams and solve the problems related to power plant cycles.</p> <p>CO 5: Understand the behavior of gas mixtures, working of air conditioning system and calculating performance parameters using psychometric chart.</p>
II/IV MECH II Sem	ME-220L	Thermal Engineering Lab-I	<p>PO: 1 Demonstrate the experiment to measure viscosity, flash and fire points of the given oils.</p> <p>PO: 2 Explain the actual valve timing and port timing diagrams for I.C engines.</p> <p>PO: 3 Evaluate the performance of the engines</p> <p>PO: 4 Estimate different ways of energy utilization in the engines</p>	<p>Upon successful completion of this course, the student will be able to..</p> <p>CO 1: To evaluate the properties of fuels and lubricants.</p> <p>CO 2: To know the actual Valve Timing and Port Timing Diagrams.</p>

				<p>CO 3: To understand the performance of SI and CI engines.</p> <p>CO: 4 To prepare Heat Balance Sheet for SI and CI engines.</p>
<p>II/IV MECH II Sem</p>	<p>ME-221</p>	<p>Machine Tools & Metrology</p>	<p>PO1: Geometry of cutting tools, types of chips, metal cutting parameters</p> <p>PO2: lathe, shaper, planer and drilling machines</p> <p>PO3: milling & grinding machines, super finishing operations.</p> <p>PO4: limits, fits & tolerances, Design of GO and NO-GO gauges, angular measurements.</p> <p>PO5: Screw thread measurements, surface finish and alignment testing, CMM- types and applications.</p>	<p>Upon successful completion of this course, the student will be able to..</p> <p>CO1: Understand the geometry of cutting tools, mechanism of chip formation and parameters of metal cutting</p> <p>CO2: Categorize various machine tools and distinguish working principles, operations & applications of lathe, shaper & drilling machines</p> <p>CO3: distinguish working principles, operations & applications of milling & grinding machines and super finishing operations.</p> <p>CO4: design limit gauges using Taylor's principle and understand the working principle of angular measurements.</p> <p>CO5: determine surface finish evaluation methods & effective diameter of screw threads and explain alignment test for lathe, CMM – types and applications.</p>
<p>II/IV MECH II Sem</p>	<p>ME-221L</p>	<p>Machine Tools & Metrology Lab</p>	<p>PO 1: To learn the science involved in operation of lathe, shaper, planer and drilling machines</p> <p>PO 2 : To impart practical exposure for measuring various parameters like length, height, angle, displacement, flatness etc., by using various instruments like vernier calipers, micrometer, dial indicator, etc</p> <p>PO 3: To perceives the knowledge required for Screw thread measurements, surface finish and alignment testings, CMM- types and applications.</p> <p>PO 4: To develop fundamental knowledge on limits, fits & tolerances, Design of GO and NO-GO gauges, angular measurements.</p>	<p>Upon successful completion of this course, the student will be able to..</p> <p>CO 1: Perform various operations on machine tools like lathe, milling machine, shaper machine, slotter machine etc.</p> <p>CO 2: Measure the various parameters like length, height, angle, displacement, flatness etc., by using various instruments like vernier calipers, micrometer, dial indicator, etc</p> <p>CO 3: The student will be able to measure and analyze the data of the threads, gear tooth profiles and surface roughness using appropriate instruments.</p> <p>CO 4: The students will be able to identify the sources of variability, error, and uncertainties</p>

II/IV MECH II Sem	ME-222	Design Of Machine Elements – I	<p>PO 1: To understand the basics of mechanics of materials and design of a machine for static and fatigue strength, rigidity and wear criterions, usage of codes and standards.</p> <p>PO 2: To know the principles of ergonomic design.</p> <p>PO 3: To learn the principles to design shafts, keys, belt drives, joints and couplings</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Analyse stress & strain induced in a machine element & decide the behaviour based on failure criterion</p> <p>CO 2: Analyse and evaluate fatigue and impact loads applied on mechanical components and realize the importance of stress concentration effects</p> <p>CO 3: Design and evaluate various joining techniques (permanent and non permanent) under different loading conditions</p> <p>CO 4: Design and analyze effects of various loading conditions on machine elements like keys, cotters, couplings, shafts, drive systems like belts pulleys</p>
II/IV MECH II Sem	ME-223	Instrumentation and control systems	<p>PO 1: To provide the knowledge of instrumentation systems and basic characteristics of a instrument, identifying the errors occur in an instrument.</p> <p>PO 2: To understand the concept of transducers, classification and their characteristics.</p> <p>PO 3: To understand the working principle of various instruments used for the measurement of strain, pressure, temperature, flow, speed and vibrations.</p> <p>PO 4: To understand the fundamentals of control systems and their classifications</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: To identify various elements of instrumentation system and their purpose in typical instruments, to identify various errors that would occur in instruments.</p> <p>CO 2: Explore various types of transducers and their characteristics.</p> <p>CO 3: Explain the measurement of the physical phenomenon. (Measurement of strain, pressure, temperature, flow, speed and vibrations.)</p> <p>CO 4: Understand and apply measurement principles in industrial requirements.</p> <p>CO 5: Understand the fundamentals of control system and the difference between the open and closed loop control systems.</p>
II/IV MECH II Sem	ME-224	Kinematics of Machinery	<p>PO 1: To understand the basic elements of machinery and their motion characteristics</p> <p>PO 2: To know the kinematic properties like velocity & acceleration of mechanisms and machines</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Understand the principles of Kinematic pairs, chains with their classification, DOF, Inversions, equivalent planar</p>

			<p>PO 3: To understand basics of lower pair mechanism.</p> <p>PO 4: To know classification and applications of cams.</p> <p>PO 5: To know classification and applications of gears and gear-trains</p>	<p>mechanisms</p> <p>CO 2: Determine the position, velocity and acceleration profiles of various planar mechanisms using graphical and analytical methods.</p> <p>CO 3: To study the various straight line mechanism & steering gear mechanisms.</p> <p>CO 4: Design cams and followers for specified motion profiles</p> <p>CO 5: Evaluate gear tooth geometry and select appropriate gears and gear trains for different applications</p>
II/IV MECH II Sem	ME-225L	Machine Drawing	<p>PO 1: To provide basic understanding and drawing practice of various joint, simple mechanical parts Selection of Views, additional views for the following machine elements and parts with every drawing proportion.</p> <p>PO 2: Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.</p> <p>PO 3: Keys, cottered joints and knuckle joint.</p> <p>PO 4: Riveted joints for plates</p> <p>PO 5: Shaft coupling, spigot and socket pipe joint.</p> <p>PO 6: Journal, pivot and collar and foot step bearings.</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Draw the assembled views for the part drawings of the following using conventions and easy drawing proportions.</p> <p>CO 2: Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.</p> <p>CO 3: Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.</p> <p>CO 4: Valves, Steam stop valve, spring loaded safety valve, feed check valve and air cock.</p>
III/IV MECH I Sem	PC3101ME	Fluid Mechanics and Hydraulic Machines	<p>PO 1: To understand the properties of fluids and types of fluids.</p> <p>PO 2: To verify the Bernoulli's theorem and its applications.</p> <p>PO 3: To understand the concepts of fluid flow measurement and flow through pipes.</p> <p>PO 4: To introduce the concepts of the working and design aspects of hydraulic machines like turbines and pumps and their applications.</p> <p>PO 5: To determine the basic principles and characteristic curves</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Define the properties of fluids and classify the fluids.</p> <p>CO 1: Apply conservation laws to fluid flow problems in engineering applications and examine the stability of floating bodies.</p> <p>CO 1: Apply Euler's Equation of motion and Bernoulli's equation for flow measuring devices and hydraulic machines.</p>

			of turbines and pumps	CO 1: Illustrate the working of Hydraulic machines. CO 1: Analyze the performance of various types of Hydraulic pumps and turbines
III/IV MECH I Sem	PC3102ME	Dynamics of Machines	PO 1: To find static and dynamic forces on planar mechanisms. PO 2: To investigate the effect of gyroscopic couple in rotating parts. PO 3: To know the causes and effects of unbalanced forces in machine members. PO 4: To study the working of various types of governors. PO 5: To determine natural frequencies of undamped, damped and forced vibrating systems of one, two and multi degree freedom systems..	Upon successful completion of this course, the student will be able to: CO 1: Compare and contrast different methods of static and dynamic analysis of various mechanisms CO 2: Evaluate Gyroscopic effects on Naval ships, Aeroplanes and Automobile. CO 3: Analyze balancing problems in rotating and reciprocating machinery. CO 4: To analyze the working of various centrifugal governors in various applications.. CO 5: Determine natural frequencies of longitudinal, transverse & torsional vibrations.
III/IV MECH I Sem	PC3103ME	Machine Design	PO 1: Importance of materials & criteria of failure of general mechanical components like springs, gears, brakes, bearings used in industry PO 2: Importance of the stresses developed under different loading conditions PO 3: Learn to apply design procedures for mechanical components like springs, gears, bearings PO 4: Learn to evaluate the design procedure based on failure theories PO 5: Learn to design components for new applications	Upon successful completion of this course, the student will be able to CO 1: Illustrate various mechanical components under different loading conditions & constraints. CO 2: Analyse various mechanical components under simple and combined loads. CO 3: Determine (material, dimensions, shape, number) mechanical components subjected to various types of loads, constraints & failure criterions. CO 4: Design mechanical components for specific applications in industry
III/IV MECH I Sem	PC3104ME	Production Planning and Control	PO 1: To understand the requirement of production planning and control for manufacturing organizations. PO 2 : To develop skills to estimate and use appropriate planning and control techniques. PO 3: Ability to evaluate, analyze and make decisions for short term as well as long term organizational growth,	Upon successful completion of this course, the student will be able to CO 1: Understand the role Production Planning and control activities in Manufacturing and Services. CO 2: Understand and perform various Forecasting techniques and problems

			<p>PO 4: To develop skills to perform production planning and control operations for any manufacturing organization.</p>	<p>CO 3: Understand and perform various Inventory Management techniques and apply in real manufacturing scenario</p> <p>CO 4: Demonstrate various Scheduling procedures</p> <p>CO 5: Evaluate and perform various line balancing concepts</p> <p>CO 6: Understand and analyse Dispatching procedures</p>
<p>III/IV MECH I Sem</p>	<p>PC3105ME</p>	<p>Design of Thermal Systems</p>	<p>PO 1: To develop the fundamental principle of solar radiation and it's measuring devises.</p> <p>PO 2: To understand the concept of solar cell system and implications of solar cell system for best performance.</p> <p>PO 3: To understand the concept of concentrated sunlight and solar power (CSP), solar cells in concentrated sunlight and design of photovoltaic systems.</p> <p>PO 4: To formulate solar thermal systems and also develop solar hybrid systems for different applications.</p> <p>PO 5: To formulate governing equations performance testing of solar collectors and combination of solar thermal and solar cell systems.</p>	<p>Upon successful completion of this course, the student will be able to:</p> <p>CO 1: Illustrate solar radiation and its physical function of the measuring devices.</p> <p>CO 2: Compare and contract technologies of solar cell fabrication methods.</p> <p>CO 3: Calculate the required size of solar cell systems for maximum output in peak hours.</p> <p>CO 4: Illustrate the solar thermal system for different applications.</p> <p>CO 5: Evaluate the performance of combined solar thermal and solar cell systems.</p>
<p>III/IV MECH I Sem</p>	<p>PC3106ME</p>	<p>Non Conventional Energy Sources</p>	<p>PO 1: Non-conventional energy sources and solar energy technologies</p> <p>PO 2: Wind, geothermal and hydrogen energy technologies</p> <p>PO 3: Fuel cell, ocean thermal energy and tidal energy</p> <p>PO 4: Biomass& biogas energy production, magneto hydro dynamic, thermoelectric & thermo-ionic power generation technologies</p>	<p>Upon successful completion of this course, the student will be able to</p> <p>CO 1: Classify non-conventional energy sources and solar energy technologies</p> <p>CO 2: Discuss the working mechanism of wind, geothermal and hydrogen energy</p> <p>CO 3: Explain the methods to extract energy from fuel cell, ocean thermal energy and tidal energy</p> <p>CO 4: Describe the working principle of biogas generation, magneto hydro dynamic, thermo-electric and thermo-ionic technologies</p>

III/IV MECH I Sem	PC3107ME	Power Plant Engineering	<p>PO 1: Explain the working of nuclear power plants and waste disposal techniques</p> <p>PO 2: Discuss the working principles of steam and combined cycle power plants</p> <p>PO 3: Describe hydrology and hydroelectric power plants</p> <p>PO 4: Evaluate the power plant economic parameters</p>	<p>Upon successful completion of this course, the student will be able to</p> <p>CO 1: Understand the types of energy resources available</p> <p>CO 2: Understand and Classify the components of nuclear power station</p> <p>CO 3: Understand the working of steam power plants</p> <p>CO 4: Understand the construction and layout of hydel power plants</p> <p>CO 5: Analyse the importance of waste disposal techniques</p> <p>CO 6: Understand the types of tariffs and power plant economics</p>
III/IV MECH I Sem	PC3109ME	Fluid Mechanics And Hydraulic Machinery Laboratory	<p>PO 1: To understand the properties of fluids and types of fluids.</p> <p>PO 2: To verify the Bernoulli's theorem and its applications.</p> <p>PO 3: To understand the concepts of fluid flow measurement and flow through pipes.</p> <p>PO 3: To introduce the concepts of the working and design aspects of hydraulic machines like turbines and pumps and their applications.</p> <p>PO 4: To determine the basic principles and characteristic curves of turbines and pumps.</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Define the properties of fluids and classify the fluids.</p> <p>CO 2: Apply conservation laws to fluid flow problems in engineering applications and examine the stability of floating bodies.</p> <p>CO 3: Apply Euler's Equation of motion and Bernoulli's equation for flow measuring devices and hydraulic machines.</p> <p>CO 4: Illustrate the working of Hydraulic machines.</p> <p>CO 5: Analyze the performance of various types of Hydraulic pumps and turbines.</p>
III/IV MECH I Sem	PC3110ME	Dynamics of Machines Lab	<p>PO 1: Find out natural frequencies and other important parameters for different vibrating systems using Universal vibration apparatus.</p> <p>PO 2: To study the effect of gyroscopic couple on rotating disc</p> <p>PO 3: To study the working of various governors</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Importance of vibrations in mechanical systems & analyse Single and multi-degree freedom vibrating systems.</p> <p>CO 2: Evaluate the reaction torque due to gyroscopic effects in</p>

			<p>PO 4: To know the effects of rotary unbalancing and methods of reduction</p> <p>PO 5: To understand the whirling phenomenon in shafts</p>	<p>systems.</p> <p>CO 3: Investigate the effect of various governors on speed control of mechanisms.</p> <p>CO 4: Inspect methods to reduce effects of static and dynamic unbalance due to rotating systems.</p> <p>CO 5: Determine the critical speeds of the whirling of different diameter shafts.</p>
III/IV MECH II Sem	PE3201ME	Metal Cutting Science and Unconventional Machining	<p>PO 1: To emphasize the various unconventional methods of machining and forming techniques.</p> <p>PO 2: To understand the principles, advantages and applications of unconventional machining and forming processes.</p> <p>PO 3: To know the various process parameters and their effect on machining and forming. To teach the modeling technique for machining processes</p> <p>PO 4: To understand the concepts involved in unconventional machining processes of USM, AJM, WJM,ECM, EDM, EBM, LBM and PAM and their applications.</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Tool geometry of cutting tools, single point tool, twist drill, milling cutter and broach. study of chip formation.</p> <p>.</p> <p>CO 2: Measurement of cutting forces using Dynamometers and temperature measuring methods</p> <p>CO 3: Understand sources of heat and heat distribution, different causes of tool wear and tool life.</p> <p>CO 4: Analyze the types of cutting fluids, properties, functions, and selection.</p> <p>.</p> <p>CO 5: Know principle, applications, advantages and disadvantages of unconventional machining processes of USM, AJM, WJM,ECM, EDM, EBM, LBM and PAM.</p> <p>.</p>
III/IV MECH II Sem	PE3202ME	Heat Transfer	<p>PO 1: To introduce the basic modes of heat transfer with governing laws and to explore the implications of these principles for system behavior.</p>	<p>Upon successful completion of this course, the student will be able to...</p>

			<p>PO 2: To study the heat transfer through fins and lumped heat analysis, develop the problem solving skill use of grover and heisler charts.</p> <p>PO 3: To introduce the mechanism of convection, use of dimensional analysis in free and forced convection, boundary layer concept and calculation of heat transfer for flow over various geometries using empirical formulae.</p> <p>PO 4: To study the radiation mode of heat transfer and the concepts of black body, emissivity black body radiation exchange, radiation shields.</p> <p>PO 5: To study the performance of heat exchanger by LMTD and NTU methods. Study the concept of boiling & condensation.</p>	<p>CO 1: Illustrate the basic modes of heat transfer with its associated laws in simple geometries.</p> <p>CO 2: Solve the problems of steady state and transient heat conduction with simple and multilayer geometries, heat transfer through fin.</p> <p>CO 3: Analyze heat transfer coefficients for free and forced convection, considering boundary layers. And velocity and thermal boundary layer concepts.</p> <p>CO 4: Develop relationships for radiation exchange between (Opaque, Diffuse, Gray) Surfaces in an enclosure, Blackbody radiation exchange and radiation shields.</p> <p>CO 5: Analyse heat exchanger performance by using the methods of Log Mean Temperature Difference (LMTD), effectiveness-NTU, and also focus on the knowledge of boiling and condensation.</p>
III/IV MECH II Sem	PE32023ME	Refrigeration and Air Conditioning	<p>PO 1: Evaluate the performance of air & vapor compression refrigeration system and explain the desirable properties of refrigerants</p> <p>PO 2: Explain the working principle of vapor absorption, non-conventional refrigeration systems</p> <p>PO 3: Estimate the cooling load capacity for a given application</p> <p>PO 4: State the design considerations in refrigeration & air-conditioning applications</p>	<p>Upon successful completion of this course, the student will be able to.....</p> <p>CO 1: Understand the basic concepts of refrigeration and analyse Vapour compression refrigeration system.</p> <p>CO 2: Understand and Classify the components of refrigeration system.</p> <p>CO 3: Evaluate the performance of Vapour absorption and Air-refrigeration system.</p> <p>CO 4: Estimate air-conditioning load to a given space required for human comfort.</p> <p>CO 5: Analyse the importance of different accessories required for air conditioning equipment.</p> <p>CO 6: Demonstrate different Air-condition and refrigeration systems.</p>
III/IV MECH II Sem	PE3204ME	Finite Element Analysis	<p>PO 1: To understand the theory and application of the finite element method for analyzing structural systems.</p> <p>PO 2: To learn Approximation theory for a variety of elements such as truss, beam and frame</p>	<p>Upon successful completion of this course, the student will be able to:</p> <p>CO 1: Illustrate the concept of Finite Element Method and realize its limitations.</p>

			<p>PO 3: To learn formulations for two-dimensional stress analysis problems & Axi-symmetric problems.</p> <p>PO 4: To understand modelling and analysis of 2D isoperimetric elements & steady state heat transfer problems.</p> <p>PO 5: To understand modelling of dynamic analysis and time dependent field problems</p>	<p>CO 2: Construct shape functions & stiffness matrix for truss, beam and frame elements.</p> <p>CO 3: Modelling the 2D stress analysis problems to obtain element stresses, strains, displacements and forces</p> <p>CO 4: Solve 1D and 2D steady state heat transfer problems such as fins & thin plates, and 2D isoperimetric elements with CST's.</p> <p>CO 5: Analyze Eigen value and Eigen vector problems and 3D stress analysis problems for finite element modelling</p>
III/IV MECH II Sem	PE3205ME	Fatigue, Creep and Fracture	<p>PO 1: Learn the concepts of fatigue design and testing.</p> <p>PO 2: Understand the factors affecting fatigue strength.</p> <p>PO 3: Conceptualize the theory of ductile and brittle fracture</p> <p>PO 4: Understand the modes of fracture and its measurement.</p> <p>PO 5: Learn the mechanism of creep and its importance in design.</p>	<p>Upon successful completion of this course, the student will be able to</p> <p>CO 1: Enumerate the design philosophy and recognize formulate fatigue design.</p> <p>CO 2: Illustrate the factors affecting fatigue and methods to improve fatigue strength.</p> <p>CO 3: Evaluate ductile and brittle fracture.</p> <p>CO 4: Predict the stress field at the crack tip.</p> <p>CO 5: Calculate and measure creep deformation.</p>
III/IV MECH II Sem	PE3206ME	Theory of Elasticity	<p>PO 1: To understand the concept of analysis of stresses</p> <p>PO 2: To understand the concept of analysis of strains.</p> <p>PO 3: To distinguish plane stress and plane strain analysis.</p> <p>PO 4: To understand & solve the problems on bending of beams & plates, torsion of shafts</p> <p>PO 5: Learn the concept to solve axisymmetric problems</p>	<p>Upon successful completion of this course, the student will be able to:</p> <p>CO 1: Illustrate the basic concepts in continuum mechanics of solids, and analyse the stresses in Cartesian coordinates to obtain the equations of equilibrium</p> <p>CO 2: Implementation of compatibility equations by analysing the strains in terms of displacements & derive the stress-strain relations for linearly elastic solids</p> <p>CO 3: Derivation of constitutive relations of plane stress and strain.</p> <p>CO 4: Evaluate the Torsion of shafts & compute bending stresses in straight & curved beams and study the bending phenomenon in plates.</p>

				CO 5: Analyse axisymmetric problems such as cylinders and rotating discs and stability of columns.
III/IV MECH II Sem	PE3210ME	Metal Cutting Science Lab	<p>PO 1: The main objective of this course is to emphasize the importance of metal cutting science lab everyday life.</p> <p>PO 2: As well as to understand the fundamental science involved in machining process and tools used.</p> <p>PO 3: The course is designed to help the students in perceiving the knowledge.</p> <p>PO 4: The process like turning, shaping, grinding and inspection.</p>	<p>Upon successful completion of this course, the student will be able to</p> <p>CO 1: The student will be able to get the basic knowledge to use of various machine tools and to produce the products.</p> <p>CO 2: The student will be able to design the single point cutting tool using grinding machine with respect to tool geometry.</p> <p>CO 3: Upon successful completion of this course, the student will be able to study of chip formatoon, types of chips and they get chip mechanism, use of different metals.</p> <p>CO 4: Upon successful completion of this course, the student will be able to determine the shear angle in turning process.</p> <p>CO 5: Upon successful completion of this course, the student will be able to determine the shear angle in shaping process.</p>
III/IV MECH II Sem	PC-3211ME	Thermal Engineering Lab-II	<p>PO 1: To understand the concept of heat transfer modes (conduction, convection and radiation) to practical applications.</p> <p>PO 2: To determine the heat transfer coefficients under free and forced convection heat transfer.</p> <p>PO 3: To determine the thermal conductivity of various materials.</p> <p>PO 4: To determine the emissivity of a test plate and Stefan Boltzmann constant.</p> <p>PO 5: Determine the performance of various refrigeration systems.</p>	<p>Upon successful completion of this course, the student will be able to.....</p> <p>CO 1: Determine the thermal conductivity of insulating powder.</p> <p>CO 2: Determine convective heat transfer coefficient for free and forced convection.</p> <p>CO 3: Perform the steady state heat conduction experiments to estimate thermal conductivity of different materials.</p> <p>CO 4: Determine the thermal conductivity of a metal rod and overall heat transfer coefficient of composite slabs.</p> <p>CO 5: Obtain the variation of temperature along the length of the pin fin under free and forced convection.</p> <p>CO 6: Determine surface emissivity of a test plate and Stefan-Boltzmann's constant.</p> <p>CO 7: Compare the COP of various refrigeration systems.</p>

IV/IV MECH I Sem	PC4101ME	CAD/CAM	<p>PO 1: Provide basic foundation in computer aided design / manufacturing Understand the fundamentals used to create and manipulate geometric models</p> <p>PO 2: Get acquainted with the basic CAD software designed for geometric modeling</p> <p>PO 3: Learn working principles of NC machines CNC control and part programming</p> <p>PO 4: Understand concept of Group Technology, FMS and CIM</p> <p>PO 5: To help the student in understanding advanced manufacturing concepts like Group.</p> <p>PO 6: Technology, flexible manufacturing systems, Computer aided Process Planning; Computer aided quality control, Artificial Intelligence etc. Course</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Describe basic structure of CAD workstation, Memory types, input/output devices and display devices and computer graphics</p> <p>CO 2: Apply of CAD computational analysis tools to engineering design and create a complete CAD documentation for an engineering design.</p> <p>CO 3: Acquire the knowledge of geometric modeling and Execute the steps required in CAD software for developing 2D and 3D models and perform transformations</p> <p>CO 4: Model complex shapes including freeform curves and surfaces</p> <p>CO 5: Explain the basic concepts of CNC programming and machining</p> <p>CO 6: Implement CNC programs for milling and turning machining operations</p> <p>CO 7: Explain fundamental and advanced features of CNC machines</p> <p>CO 8: Illustrate Group Technology, CAQC and CIM concepts</p>
IV/IV MECH I Sem	PC4102ME	Industrial Automation	<p>PO 1: To introduce the importance of automation techniques manufacturing and process industries.</p> <p>PO 2: To impart the role of PLC in industry automation.</p> <p>PO 3: To expose to various control techniques employed in process automation.</p> <p>PO 4: To develop automation system for manufacturing and</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Understand the basics of PLC programming. Understand the different parameters of PLC.</p> <p>CO 2: Design different process control applications through ladder logic.</p>

			process industries.	<p>CO 3: Analyze& explain different functions of PLC.</p> <p>CO 4: Build and experiment with PLC based SCADA systems for various industrial applications.</p> <p>CO 5: Implement HMI, distributed control system and Industry standard 4.0</p>
IV/IV MECH I Sem	PC4103ME	Advanced Material Science	<p>PO 1: To Understand the behaviour of materials at nano scale</p> <p>PO 2: To make students familiar with different types approaches of nano fabrication</p> <p>PO 3: To Identify advanced techniques available for characterization of materials</p> <p>PO 4: Select constituent materials for producing a given composite</p> <p>PO 5: Identify suitable processes to develop fibre reinforced composite materials.</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Dist Distinguish Nanomaterials and select fabrication methods of Nano Materials</p> <p>CO 2: Create and characterize nanostructures</p> <p>CO 3: Describe the size effect on optical, electrical, mechanical, magnetic and thermal properties</p> <p>CO 4: Select matrices for composite materials in different applications.</p> <p>CO 5: Describe key processing methods for fabricating composites.</p>
IV/IV MECH I Sem	PC4104ME	Computational Fluid Dynamics	<p>PO1: Basics, solution procedure of CFD and Navier-Stokes Equations</p> <p>PO2: Turbulence and classification of partial differential equations</p> <p>PO 3: Nature of parabolic and elliptic partial differential equations</p> <p>PO 4: Nature of hyperbolic partial differential equations, stability analysis and FVM</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO1: design a simple geometry using CFD procedure and derive the Navier-Stokes Equations</p> <p>CO 2: derive the Navier-Stokes equations in conservative forms, explain turbulence models and classify partial differential equations</p> <p>CO 3: solve parabolic and elliptic partial differential equations</p> <p>CO 4: evaluate hyperbolic partial differential equations, understand stability analysis and FVM</p>
IV/IV MECH I Sem	PC4105ME	Computational Fluid Dynamics	PO 1: Design and develop Mechatronics systems to solve the complex engineering problem by mathematical modeling single and multi-disciplinary systems.	Upon successful completion of this course, the student will be able to...

			<p>PO 2: Understanding the industrial need of integrating traditional boundaries of mechanical, electronics, mechanical and control systems engineering with an concurrent approach.</p> <p>PO 3: Apply the engineering knowledge to conduct investigations of complex engineering problem related to instrumentation, control, automation, robotics and provide solutions.</p>	<p>CO 1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.</p> <p>CO 2: Introduces the areas of technology involving sensors and measurement systems, drive and actuation systems, analysis of the behavior of systems, control systems and microprocessor systems.</p> <p>CO 4: Enhance intelligent practical knowledge by replacing mechanical components with an electronics solution. CO 4 : Demonstrate knowledge and understanding in enhancing existing mechanical design with intelligent control by Implementing electronics control in a mechanical system.</p> <p>CO 5: 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 their limitations.</p> <p>CO 6: 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.</p>
IV/IV MECH I Sem	PE4106 ME	Tool Design	<p>PO 1: To understand the basic knowledge of select appropriate materials for tooling applications</p> <p>PO 2: To grasp the Design, develop, and evaluate cutting tools and work holders for a manufactured product</p> <p>PO 3: To comprehend the basic knowledge of press tools for sheet metal working.</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Understand ASA and ORS systems of tool geometry . Design a single point or multi point cutting tool to machine a required job.</p> <p>CO 2: Design a die and punch for blanking, piercing, drawing and bending operations.</p> <p>CO 3: Discriminate the knowledge of Jigs and Fixtures design</p> <p>CO 4: Apply the concepts and design of GO and NO GO gauge.</p>
IV/IV MECH I Sem	PE4107ME	Additive Manufacturing	<p>PO 1: To understand the fundamental concepts of Additive Manufacturing (AM), its advantages, limitations and classifications.</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Interpret the features of Additive Manufacturing (AM)</p>

			<p>PO 2: To know the working principle, advantages, disadvantages and applications of Vat Photo Polymerization, Material Jetting, Binder Jetting, Material Extrusion powder bed 3fusion AM Technologies.</p> <p>PO 3: To understand the basic concept of powder bed & sheet lamination AM system</p> <p>PO 4: To know the various types of STL file errors and other data formats & understand features of various AM software and the concept of Topology optimization in AM.</p> <p>PO 5: To understand the diversified applications of AM.</p>	<p>and compare it with conventional CNC Technology.</p> <p>CO 2: Illustrate the working principle, advantages, limitations and applications of various Additive Manufacturing Technologies.</p> <p>CO 3: Interpret various types of errors in STL file and other data formats used in AM and identify the role of Topology optimization in AM.</p> <p>CO 4: Analyze different types of software's used in 3D Printing Technology.</p> <p>CO 5: Apply the knowledge of various AM technologies for developing innovative applications.</p>
IV/IV MECH I Sem	PE4108ME	Design for Manufacturing	<p>PO 1: To understand the basic concepts of design principles involved in manufacturing and raw materials used.</p> <p>PO 2: To understand the concept of sheet metal design.</p> <p>PO 3: To understand the concepts of precision grinding and surface finishing operations.</p> <p>PO 4: To understand the basic concepts in design of permanent joining.</p> <p>PO 5: To understand the basic concepts in design of screw and bolt connections.</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: To evaluate the theory behind the design principles involved in manufacturability.</p> <p>CO 2: To identify the effective and economical use of raw-materials.</p> <p>CO 3: To design various metallic components like Metal extrusion, drilled parts, milled part, planned shaped and slotted parts.</p> <p>CO 4: To understand various permanent metallic designs like resistance, arc welding, soldering and brazed parts.</p> <p>CO 5: To design screw threaded contoured and internal ground parts.</p>
IV/IV MECH I Sem	PE4109ME	Fuel cell Technology	<p>PO 1: To introduce the fundamental knowledge fuel cell working principle and their utilizations.</p> <p>PO 2: To learn performance analysis of fuel cell through thermodynamics and electrochemistry.</p> <p>PO 3: To understand the design concept of the fuel cell subsystems</p>	<p>Upon successful completion of this course, the student will be able to</p> <p>CO 1: Describe the fundamental concept of fuel cell system and their relative merits and demerits and also compare with other systems</p> <p>CO 2: Understand the various types of fuel cells working</p>

				<p>mechanisms.</p> <p>CO 3: Execute appropriate fuel cell technology for a given application.</p> <p>CO 4: Evaluate the performance of fuel cells under different operating conditions and also know the fuel cell heat management.</p> <p>CO 5: Develop enough skills to design and require subsystems of the fuel cell system.</p>
IV/IV MECH I Sem	OE4111EC	Optimization Techniques	<p>PO 1: To study about the linear programming and non-linear programming concepts and their applications</p> <p>PO 2: To understand various constrained and un-constrained optimization techniques and their applications.</p> <p>PO 3: To understand the concepts and implementation of Genetic Algorithms to get the optimum solutions</p> <p>PO 4: To study the concepts of Meta-heuristics Optimization techniques</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Analyze the real life systems with limited constraints and evaluate Single variable and Multivariable Optimization with Equality Constraints and Inequality Constraints</p> <p>CO 2: Define, formulate and Construct the L.P. Models to solve the problems with variables.</p> <p>CO 3: Understand the concepts of various direct and indirect random search methods.</p> <p>CO 4: Selecting variables and cost functions to execute binary genetic algorithm.</p> <p>CO 5: Evaluate the concept of meta-heuristic optimizations and its applications.</p>
IV/IV MECH I Sem	PC4113ME	Product Design by CAD Lab	<p>PO 1: To become familiar with Full-Scale CAD Software systems designed for geometric modelling of engineering components.</p> <p>PO 2: Gaining knowledge of Analysis of mechanical components under static conditions using Finite Element Techniques.</p> <p>PO 3: Becoming familiar with CNC machine tools, Its features and elements, practice manual part programming using miscellaneous and preparatory functions (M & G codes).</p> <p>PO 4: Getting exposed to the manufacturing process through flexible manufacturing Systems.</p>	<p>Upon successful completion of this course, the student will be able to</p> <p>CO 1: Apply CAD software for the geometric modelling of components</p> <p>CO 2: Analyse mechanical components by using Finite Element techniques</p> <p>CO 3: Apply M & G codes in part programming used for CNC machine tools.</p> <p>CO 4: Demonstrate flexible manufacturing system.</p>

IV/IV MECH II Sem	PE4201 ME	Industry 4.0	<p>PO 1: Industry 4.0 components such as: automation, data exchanges, cloud, cyber-physical systems, mobile, robots, Big Data, deep machine learning, IoT, distributed systems and agile methodology.</p> <p>PO 2: Convergence between consumer and industrial applications, evolution of connectivity technologies and data processing.</p> <p>PO 3: Study how technology applications in Industry 4.0 will change industrial production</p> <p>PO 4: Study how Industry 4.0 contributes to competitive advantages from a management perspective</p> <p>PO 5: Strategize how businesses in different industries can benefit from Industry 4.0, in line with their needs and opportunities</p> <p>PO 6: Understand human oriented aspects of the IoT trend (quantified self) and data security issues and IT security principles, reliability and stability, and maintaining the integrity of the production process</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Comprehend Business model innovation through Industry 4.0</p> <p>CO 2: Comprehend IoT, cyber-physical systems, cloud computing and big data, smart factories and their role in Industry 4.0</p> <p>CO 3: Understand drivers and enablers of Industry 4.0, including policy support</p> <p>CO 4: Understand the nature of the fourth industrial revolution and theoretical concepts</p> <p>CO 5: Understand the opportunities, and challenges brought through Industry 4.0</p>
IV/IV MECH II Sem	PE4202 ME	Non Destructive Testing	<p>PO 1: Introduce basic concepts of non-destructive testing.</p> <p>PO 2: Familiarize with characteristics of ultrasonic test, transducers, rejection and effectiveness.</p> <p>PO 3: Describe concept of liquid Penetrant, and magnetic particle tests, its applications and limitations.</p> <p>PO 4: Explain the principles of eddy current tests Understand the radiography tests with special emphasis on safety measures</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Able to understand the basic principles ,techniques and equipment of NDT methods.</p> <p>CO 2: Able to analyse and interpret the results from NDT TESTS</p> <p>CO 3: Able to apply the codes, standards and specifications used in NDT</p> <p>CO 4: Able to select proper NDT method for inspection of</p>

				<p>industrial products</p> <p>CO 5: Able to know the developments and future trends in NDT</p>
IV/IV MECH II Sem	PE4203 ME	Total Quality Management	<p>PO 1: Total quality management (TQM) & TQM philosophies</p> <p>PO 2: Planning and quality management systems</p> <p>PO 3: TQM principles and customer satisfaction</p> <p>PO4: Statistical process control, tools and techniques of quality management</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: differentiate between traditional approach and TQM; assess & implement TQM philosophies</p> <p>CO 2: Analyze quality statements; implement quality management systems</p> <p>CO 3: Appraise the importance of TQM leadership, management commitment, teamwork and customer satisfaction</p> <p>CO 4: Select statistical process control charts, tools and techniques to enhance the quality of processes or products</p>
IV/IV MECH II Sem	PE4204 ME	Tribology	<p>PO 1: To understand the various fluid flow parameters and concept of hydrostatic lubrication and its applications</p> <p>PO 2: To provide the basic knowledge in hydro dynamic theory of lubrication</p> <p>PO 3: To understand the various losses in design of journal bearings</p> <p>PO 4: To classify air lubricated journal bearings and study its advantages, disadvantages and applications</p> <p>PO 5: To know the different types of bearing oil pads & bearing materials</p>	<p>Upon successful completion of this course, the student will be able to</p> <p>CO 1: Study various parameters such as viscosity variation with respect to temperature, viscosity index and apply hydrostatic lubrication concept to different types of bearings</p> <p>CO 2: Describe various theories of lubrication and analyse journal bearings for hydrodynamic theory of lubrication</p> <p>CO 3: Analyse friction and power losses in designing of journal bearings</p> <p>CO 4: Analyse the compressibility effect on various air lubricated journal bearings and</p> <p>CO 5: Illustrate the types of bearing oil pads & types of bearing materials</p>
IV/IV MECH II Sem	PE4205 ME	Automobile Engineering	<p>PO 1: Summarize the history & basic principle of an automobile.</p> <p>PO 2: Compare types of Drive trains and Transmission Systems.</p> <p>PO 3: Study types of Steering, Axle, Wheels and Tyres.</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Identify principal parts of an automobile and their layout.</p>

			<p>PO 4: Examine various types of Suspension and braking systems.</p> <p>PO 5: Understand alternative energy sources for automobiles.</p>	<p>CO 1: Illustrate the working principles of Drive train and Transmission Systems.</p> <p>CO 1: Enumerate the working principles of Steering, Axle, Wheels and Tyres.</p> <p>CO 1: Examine the functioning of Suspension and braking systems.</p> <p>CO 1: Analyse of alternative Energy Sources for Automobile applications and latest automobiles.</p>
IV/IV MECH II Sem	PE4207 ME	Industrial Robotics	<p>PO 1: To familiarize the student with the anatomy of robot and their applications.</p> <p>PO 2: To provide knowledge about various kinds of end effectors usage.</p> <p>PO 3: To equip the students with information about various sensors used in industrial robots.</p> <p>PO 4: To make the student understand the importance of spatial transformation of robots using forward and inverse kinematics.</p> <p>PO 5: To specify and provide the knowledge of techniques involved in robot vision in industry.</p> <p>PO 6: To equip students with latest robot languages implemented in industrial manipulators.</p>	<p>Upon successful completion of this course, the student will be able to...</p> <p>CO 1: Able to demonstrate knowledge of the relationship between mechanical structures of industrial robots and their operational workspace characteristics and have an understanding of the functionality and limitations of robot actuators and sensors.</p> <p>CO 2: Able to demonstrate an ability to apply spatial transformation to obtain Forward/Inverse kinematics equation of robot manipulators using analytical/numerical/simulation tools.</p> <p>CO 3: Able to apply knowledge and choose the best & economically suitable sensors/end effectors required for specific applications.</p> <p>CO 4: Able to understand the importance of robot vision and apply the learnt techniques to get the required information from input images.</p> <p>CO 5: Able to design and develop a industrial robot for a given purpose economically.</p> <p>CO 6: Appreciate the current state and potential for robotics in new application areas.</p>