

KATHIR COLLEGE OF ENGINEERING, COIMBATORE

Affiliated to Anna University, Chennai

DEPARTMENT OF MECHANICAL ENGINEERING

R2013 REGULATION

PROGRAMME OUTCOMES (POs)

Students graduating from Mechanical Engineering should be able to:

PO1.Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2.Problem analysis: Identity, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3.Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4.Conduct investigations of complex problems: Use research – based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5.Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend

and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in self, and lifelong learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOME (PSOs)

PSO1: Understand the requirements and play their professional role to solve real-world problems in the mechanical engineering domains such as manufacturing, design, thermal, fluid power and materials engineering.

PSO2: Work in teams to create products by integrating multidisciplinary modules.

PSO3 : Foresee the future needs of society and prepare for his professional role.

SEMESTER V	
ME6501 - Computer Aided Design	
CO1	Describe the product cycle design process, sequential and concurrent Engineering.
CO2	Explain the various types of curves, patches and surfaces and the constructive solid geometry with Boundary representation techniques
CO3	Apply the principle of visual realism for line, surface and solid removal algorithms and Explore the techniques involved in shading and coloring.
CO4	Assemble the machine parts in different interfacing of positions and orientation and Calculate the mass property in the assembly modelling..
CO5	Appraise the uses of standard for GKS and open GL library.

ME6502 Heat and Mass Transfer	
CO1	Demonstrate the different modes of heat transfer through different sections.
CO2	Solve the problems in different types of conduction, convection and radiation.
CO3	Acquired the knowledge of phase change and various methods of heat exchanging processes
CO4	Solve problems on radiation between different sections
CO5	Demonstrate the transfer of mass between different mediums.

ME6503 - Design of Machine Elements	
CO1	To calculate principal stresses in machine members under steady and variable loading.
CO2	To propose required shafts and couplings for the given application.
CO3	To design the parameters of permanent and temporary joint on various types of loading application.
CO4	To design energy storage elements such as springs / fly wheels and connecting rod
CO5	To select the sliding / rolling contact bearing for the given application.

ME6504 - Metrology and Measurements	
CO1	To explain the fundamentals of metrology like precision, accuracy, error and standards.
CO2	To classify linear and angular measuring instruments and explain the principle of working.
CO3	To describe laser metrology, auto collimator, CMM and its applications.
CO4	To use form measurement techniques for the given component.
CO5	To describe principles of flow, power and temperature measuring instruments.

ME6505 - Dynamics of Machines	
CO1	Analyze the inertia and dynamic force in mechanical system such as engine, connecting rod, bearing and flywheel.
CO2	Evaluate the balancing of rotating and reciprocating masses of the engines.
CO3	Compare and contrast the types of damping in vibration of shafts with defined degrees of freedom.
CO4	Distinguish forced vibration as a result of harmonic / unbalance disturbances and its measurement.
CO5	Estimate the speed of governors and determine the gyroscopic couple / effect.

GE6075 - Professional Ethics in Engineering	
CO1	To distinguish between Moral and Ethics.
CO2	To Summarize the moral theories and ethical inquiries.
CO3	To evaluate the result of the engineering projects by applying ethical theories.
CO4	Discuss about professional rights, employ rights and intellectual property rights, safety and risk involved in engineering projects.
CO5	Judge the role of engineer in environmental issues, computer applications weapons development, multinational corporations and Corporate Social Responsibility.

ME6511 - Dynamics Laboratory	
CO1	Ability to demonstrate the principles of kinematics of machinery.
CO2	Ability to demonstrate the principles of dynamics of machinery.
CO3	Ability to use the measuring devices for dynamic testing.
CO4	Ability to study the parameters of kinematics of machinery.
CO5	Ability to study the parameters of dynamics of machinery.

ME6512 - Thermal Engineering Laboratory II	
CO1	Ability to determination of Thermal conductivity for a given material.
CO2	Ability to determination of heat transfer coefficient for a given equipment.
CO3	Ability to determination of Stefan Boltzmann constant and emissivity of a grey surface
CO4	Ability to determination of effectiveness of a heat exchanger and cooling tower performance characteristics.
CO5	Ability to determination of COP of an AC, refrigeration system and air compressor performance characteristics.

ME6513 - Metrology and Measurements Laboratory	
CO1	To provide knowledge on various Metrological equipments available to measure the dimension of the components.
CO2	To get familiar with flatness measurement equipment and surface roughness measurement
CO3	To provide knowledge about force, torque, temperature, displacement and vibration measurements
CO4	To provide knowledge about Use of slip gauges, Sine bar and measurement of Screw threads & Gear tooth parameters.
CO5	To Calibrate the measuring equipments using slip gauge

SEMESTER VI**ME6601 Design of Transmission Systems**

CO1	Ability to design flexible drive elements like belt, chain and rope drives.
CO2	Ability to design parallel axis helical gears like spur gears.
CO3	Ability to design bevel, worm and cross helical gears.
CO4	Ability to design multispeed gear box for mechanical applications.
CO5	Ability to design cam, clutches and brakes for automotive and mechanical applications.

MG6851 Principles of Management

CO1	Understand the definition of management, evolution of management, types of business organization and role of managers in a business entity.
CO2	Know and understand the planning strategy, setting an objective oriented planning, tools and techniques applied for planning and decision
CO3	Understand the organization structure, roles, delegation of authority. Understand the human resource planning, recruitment process, training and development.
CO4	Understand the importance of directing workforce, motivation to employees, job enrichment, and essentials of communication between entities of business.
CO5	Understand and generate budget controls, productivity improvement and control framework for achieving the above objectives.

ME6602 Automobile Engineering

CO1	Understand the various vehicle structure and Components of IC engine.
CO2	Gain Knowledge in various auxiliary systems used in an automobile.
CO3	Understand the principle and application of Transmission systems in an automobile.
CO4	Demonstrate the use of steering, braking and suspension systems in an automobile
CO5	Apply the advantages of various alternative energy sources.

ME6603 Finite Element Analysis

CO1	Ability to solve boundary value problems and governing equation in engineering fields
CO2	Ability to solve one dimensional equation problems on field variable
CO3	Ability to solve higher order equation using scalar and vector variable Equation

CO4	Ability to solve problems on plane stress and plane strain conditions
CO5	Ability to solve axisymmetric, isoperimetric element and serendipity element in numerical formulation

ME6604 Gas Dynamics and Jet Propulsion

CO1	Ability to learn the concept behind gas dynamics and understand the importance of compressible and incompressible flows, significance of energy equation of flow processes, and flows with variable area ducts such as nozzles and diffusers.
CO2	Ability to study flows with constant area ducts such flow through pipelines, variation of flow properties due to change in area, frictional effects, heat transfer and understand the phenomena of Isentropic, Fanno and Rayleigh flows
CO3	Ability to understand the concept of normal and oblique shock waves and their significance
CO4	To understand the thrust equation and to study the operating principle of air breathing engines and its types,
CO5	To understand the thrust equation and to study the operating principle of non-air breathing engines such as rockets

ME6004 Unconventional Machining Processes

CO1	To understand the need and classification of unconventional machining processes.
CO2	To understand the construction, working principle, influence of process parameters and application of Mechanical Energy based processes.
CO3	To understand the construction, working principle, influence of process parameters and application of Electrical Energy based processes.
CO4	To understand the construction, working principle, influence of process parameters and application of Chemical and Electro chemical Energy based processes.
CO5	To understand the construction, working principle, influence of process parameters and application of Thermal Energy based processes.

ME6611 CAD/CAM Laboratory

CO1	Ability to Develop 2D Part Models using Modeling Software.
CO2	Ability to Develop 3D Part Models using Modeling Software.
CO3	Ability to Assemble 3D Models using Modeling Software.
CO4	Ability to Understand the CNC Control in Modern Manufacturing System.
CO5	Ability to Prepare CNC Part Programming and Perform Manufacturing.

ME6612 Design and Fabrication Project	
CO1	Identify a topic in advanced areas of Mechanical Engineering
CO2	Identify methods and materials to carry out experiments/develop code
CO3	Review literature to identify gaps and define objectives & scope of the work
CO4	Reorganize the procedures with a concern for society, environment and ethics
CO5	Generate and implement innovative ideas for social benefit

GE6674 Communication and Soft Skills - Laboratory Based	
CO1	Ability to make presentations and participate in Group Discussions.
CO2	Ability to Answer questions in Interviews.
CO3	Ability to improve reading skills, writing skills, speaking skills.
CO4	Ability to improve vocabulary, grammar, analytical skills

SEMESTER VII	
ME6701 Power Plant Engineering	
CO1	Ability to comprehend the Layout of modern coal power plant and its major components, Binary Cycles and Cogeneration systems.
CO2	Able to understand the concept of Otto, Diesel, Dual & Brayton Cycle - Analysis & optimization and Components of Diesel and Gas Turbine power plants.
CO3	Ability to know the Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors : BWR, PWR, CANDU, Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.
CO4	Ability to comprehend the concept of Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, SPV, Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems.
CO5	To understand the concept of Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.
ME6702 Mechatronics	
CO1	To impart knowledge about the elements and techniques involved in Mechatronics system

CO2	To understand the emerging field of automation.
CO3	To design mechatronics system with the help of Microprocessor
CO4	To design mechatronics system with PLC
CO5	To design mechatronics system with other electrical and Electronics Circuits

ME6703 Computer Integrated Manufacturing Systems

CO1	Ability to understand management art, managerial roles and human relations in an organization and to make students aware of the types of business organizations and its environmental cultures.
CO2	Ability to understand the nature and purpose of planning and also how the planning process is carried out in setting the objectives followed by understanding policy making, strategic planning and decision making process.
CO3	To make Students clear about the types of organization, delegation of authority, centralization and decentralization process which results to gain knowledge about human resource management and career planning and management.
CO4	Ability to understand the foundations of individual and group behaviours, motivational aspects and also to improve the leadership qualities to break the barriers for an effective communication.
CO5	Ability to understand the controlling techniques in an organization and proper application of computers for a effective management control.

GE6757 Total Quality Management

CO1	To understand the frame work of Total Quality Management emphasizing the importance of quality and customers
CO2	To understand the TQM principles with reference to qualities of leadership, employee involvement and team work for the continuous process improvement
CO3	To understand and apply the conventional and new management tool procedures for Total Quality Management
CO4	To learn the various tools of performance measures for the implementation of quality management
CO5	To understand the need for quality regulatory system and its documentation procedures

ME6005 Process Planning and cost Estimation

CO1	Ability to use the concepts of process planning for various products.
CO2	Ability to use the concepts of cost estimation for various products.
CO3	Ability to use the Machining time calculation for various process.
CO4	Ability to use of process planning with cost Estimation concepts.
CO5	Ability to use of process planning with Machining time concepts.

ME6010 Robotics

CO1	To understand the functions of the basic components of a Robot.
CO2	To study the use of various types of End of Effectors
CO3	To understand the working of sensors and machine vision system
CO4	To impart knowledge in Robot Kinematics and Programming
CO5	To learn Robot safety issues and economics.

ME6711 Simulation and Analysis Laboratory

CO1	To get familiar with the Finite Element (FE) modeling of structural elements with loading and boundary conditions
CO2	To understand and apply the structural and dynamic analysis of structural elements
CO3	To understand and apply the types thermal and dynamic analysis of structural elements.
CO4	To learn and solve core mechanical engineering problems using MATLAB computational package.
CO5	Explain Verification and Validation of simulation model.

ME6712 Mechatronics Laboratory

CO1	To know the design, modeling & analysis of basic pneumatic Systems
CO2	To know the design, modeling & analysis of basic electrical and electro pneumatic Systems
CO3	To know the design, modeling & analysis of basic hydraulic Systems
CO4	To know the method of programming the PLC and Labview
CO5	To enable the students to understand the concept of mechatronics

ME 6713 Comprehension	
CO1	Ability to Apply the knowledge acquired during the earlier semesters to real life problems
CO2	Understand the fundamentals of contemporary manufacturing systems including materials, manufacturing process, product and process control, computer integrated manufacture and quality.
CO3	The students able to work in groups and solve a variety of problem.
CO4	Ability to track out the objective type questions in engineering courses
CO5	To understand the importance of design, analysis and automation in the field of mechanical engineering

SEMESTER VIII	
MG6863 Engineering Economics	
CO1	Ability to apply basic economic concepts in economic analysis
CO2	Ability to learn time value of money and interest rates
CO3	Ability to learn revenue based and cost based cash flow analysis
CO4	Ability to learn replacement and maintenance based on economic life
CO5	Ability to learn depreciation and inflation based on economic life

IE6605 Production Planning and Control	
CO1	Explain various production control methods which can be applied to specific situations and state their relationship to the product/process involved.
CO2	Make forecasts in the manufacturing and service sectors using selected quantitative and qualitative techniques.
CO3	Apply the principles and techniques for planning and control of the production and service systems to optimize/make best use of resources.
CO4	Understand the importance and function of inventory and to be able to apply selected techniques for its control and management under dependent and independent demand circumstances
CO5	Demonstrate and explain the use of Manufacturing Requirements Planning (MRP2), Just - In - Time (JIT) techniques in terms of operation and their importance in Lean World Class Manufacturing.

ME6016Advanced I.C Engines	
CO1	Ability to understand the performance & characteristics a S.I Engine.
CO2	Ability to understand about various injection systems, Fuel Spray behavior, Stages of combustion, Turbo charging, Combustion chambers and Knocking in C.I Engine.
CO3	Ability to understand various pollutants and its formations, method of controlling Emissions, Methods of measurement, Emission norms and Driving cycles.
CO4	Ability to understand various alternative fuels, their suitability and corresponding Engine Modifications.
CO5	Ability to understand about the recent trends in I.C. Engine's Injection Systems, Combustion, ignition, Hybrid Vehicles and Onboard Diagnostics.

ME6811Project work	
CO1	Identify a topic in advanced areas of Mechanical Engineering Identify methods and materials to carry out experiments/develop code
CO2	Review literature to identify gaps and define objectives & scope of the work Reorganize the procedures with a concern for society, environment and ethics
CO3	Generate and implement innovative ideas for social benefit Analyze and discuss the results to draw valid conclusions
CO4	Develop a prototypes/models, experimental set-up and software systems necessary to meet the objectives Prepare a report as per recommended format and defend the work
CO5	Explore the possibility of publishing papers in peer reviewed journals/conference proceedings