ACHARYA INSTITUTE OF TECHNOLOGY

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DEPARTMENT OF MECHANICAL ENGINEERING

2022 SCHEME

Course Name	Course Code	CO. No.	Course Outcomes
MECHANICS OF MATERIALS	BME301	CO1	Compute the relationship between elastic constants and material behavior under different load conditions.
		CO2	Solve the state of stress and behavior of thick and thin cylinders
		CO3	Illustrate bending moment and shear force distribution in beams for the different loads
		CO4	Examine bending moment and shear force distribution in beams
		CO5	Determine torsional strength of shafts and rigidity of columns
MANUFACTURING PROCESS	BME302	CO1	Describe the use of patterns, cores, gating system and sand moulding processes in foundry technology.
		CO2	Discuss the various melting furnaces, metal moulding processes and defects in castings
		CO3	Analyze the principles of metal forming and working processes
		CO4	Discuss the operating principles and applications of different welding processes.
		CO5	Discuss the concepts of weldability and advanced joining processes.
		CO6	Determine the properties of moulding sand and defects of cast and welded components by NDT.
		CO7	Prepare sand moulds, welded joints and forged components.
MATERIALS SCIENCE AND ENGINEERING	BME303	CO1	Understand the structure of engineering materials and role of imperfections.
		CO2	Interpret the various diffusion mechanisms and phase diagram of alloys.
		CO3	Illustrate the nucleation and the effect of heat treatment on metals and alloys.
		CO4	Explain the techniques of surface coating, powder production and their characterization.
		CO5	Summarize the types, properties, selection and applications of different materials.
		CO6	Understand the structure and surface morphology of materials.

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		CO7	Compute the materials strength subjected to different characterization techniques.
BASIC THERMODYNAMICS	BME304	CO1	Demonstrate the fundamentals of thermodynamic properties and energy interactions.
		CO2	Apply first law thermodynamics to various processes and systems.
		CO3	Use 2nd law of thermodynamics and entropy for different cycles.
		CO4	Solve various states and phase change of pure substances with practical applications.
		CO5	Determine thermodynamics properties of ideal, real and gas mixtures.
INTRODUCTION TO MODELLING AND DESIGN FOR MANUFACTURING	BMEL305	CO1	Comprehend the computer-aided sketching and fundamental principles of Geometrical Dimensioning and Tolerances (GD&T) adhering to BIS standards.
		CO2	Practice the basic modeling features in CAD software
		CO3	Develop basic assemblies of joints and machine parts.
		CO4	Model different machine assemblies and drawings.
SMART MATERIALS & SYSTEMS	BME306B	CO1	Understand smart materials structures and their applications.
		CO2	Describe the principles of piezoelectric materials and their use in sensors
		CO3	Understand shape memory alloys, ceramics, polymers and their applications
		CO4	Understand thermal & photo-responsive of polymers and drug delivery applications.
		CO5	Summarize various load activated smart materials in engineering applications.
ABILITY ENHANCEMENT COURSE/ SKILL ENHANCEMENT COURSE-III	BME358	CO1	Use Excel functions and charts for a wide range of calculations and data manipulations.
		CO2	Solve matrix operations, regression analysis and iterative solutions.
		CO3	Develop macros with the assistance of user-defined functions, subroutines, and VBA structures to solve approximate methods
APPLIED THERMO DYNAMICS	BME401	CO1	Analyze the air standard cycles and performance of IC engines.
		CO2	Evaluate the efficiency of gas power cycles and jet propulsion engines.

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		CO3	Analyze the performance of vapour power cycles by flow and property diagram.
		CO4	Examine the performance of refrigeration cycles and air-conditioning systems
		CO5	Discuss the working of reciprocating compressors and the effect of steam in the nozzles.
MACHINING SCIENCE AND METROLOGY	BME402	CO1	Describe various cutting tool materials, machine tools, machining processes and metal forming processes.
		CO2	Explain the mechanism of machining processes, cutting tool materials, tool nomenclature, tool wear, tool life and economics of machining processes and metal forming processes.
		CO3	Estimate the effect of machining processes and parameters on surface finish, tool wear, tool life, machining efficiency and to estimate the effect of different forces acting on the dies during sheet metal operations.
FLUID MECHANICS	BME403	CO1	Able to understand the basics of fluid properties, statics, dynamics, kinematics, concept of boundary layer in fluid flow as well as CFD
		CO2	Able to explain the principle of buoyancy and flotation, laminar and turbulent flow, flow across body and checking dimensional homogeneity
		CO3	Able to calculate the key fluid properties, meta centric height, lift, drag and applying Bernoulli's equation to devices
MECHANICAL MEASUREMENTS AND METROLOGY	BME404	CO1	Able to gain knowledge on how to use different metrology measuring instruments.
		CO2	Able to understand and demonstrate different measuring instruments
		CO3	Able to illustrate the measurement of force, torque, pressure, strain, temperature, screw and gear profile etc.

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2021 SCHEME

Course Name	Course Code	CO. No.	Course Outcomes
TRANSFORM CALCULUS,	21MAT31	CO1	Understand the concepts of Complex variables, Complex integration, Probability distributions, Linear Programming problems and Transport & Assignment problems.
		CO2	Demonstrate various physical phenomena using the concepts of Complex variables, Complex integration, Probability distributions, Linear Programming problems and Transport & Assignment problems.
		CO3	Apply the knowledge of Complex variables, Complex integration, Probability distributions, Linear Programming problems and Transport & Assignment problems in modeling various physical and engineering phenomena.
		CO4	Relate the concepts of Complex variables, Complex integration, Probability distributions, Linear Programming problems and Transport & Assignment problems in various engineering problems related to the ME and allied engineering branches.
METAL CASTING, FORMING	IPCC 21ME32	CO1	Describe the use of patterns, cores, gating system and sand moulding processes in foundry technology.
		CO2	Discuss the various melting furnaces, metal moulding processes and defects in castings.
		CO3	Analyze the behaviour of metals subjecting to forming and hardworking processes.
		CO4	Discuss the operating principles and applications of different welding processes.
		CO5	Discuss the concepts of weldability and advanced joining processes.
		CO6	Discuss the concepts of weldability and advanced joining processes.
		CO7	Prepare sand moulds, welded joints and forged components
MATERIAL SCIENCE AND	IPCC 21ME33	CO1	Describe the atomic arrangement in crystalline materials and periodic arrangement of atoms in terms of unit cell parameters.Apply the importance of phase diagrams and the phase transformations
		CO2	Apply various heat treatment methods for controlling the microstructure
		CO3	Apply the method of materials selection, material data and knowledge sources for computer-aided selection of materials

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Course	Code	CO	Description
		CO4	Analyse material properties with component design and identify various kinds of defects
THERMO DYNAMICS	21ME34	CO1	Define/state the terms/laws involved in thermodynamics
		CO2	Sketch the block/PV/TS/PH/HS diagrams by understanding the problem statements
		CO3	Obtain the relation by analyzing the sketches or from the given scenario C204.4 Calculate the particulars/performance of an engine/process from the relations obtained earlier.
MACHINE DRAWING	IPCC 21ME33	CO1	Interpret the Machining and surface finish symbols on the component drawings.
		CO2	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies
		CO3	Illustrate various machine components through drawings
		CO4	Create assembly drawings as per the conventions.
CONSTITUTION OF INDIA	HSMC 21CIP37/ 47	CO1	Analyse the basic structure of Indian Constitution.
		CO2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution
		CO3	Know about our Union Government, political structure & codes, procedures.
		CO4	Understand our State Executive & Elections system of India.
		CO5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.
SAMSKRUTIKA KANNADA	21KBK37 /47	CO1	To understand the necessity of learning of local language for comfortable life.
		CO2	To Listen and understand the Kannada language properly.
		CO3	To speak, read and write Kannada language as per requirement.
		CO4	To communicate (converse) in Kannada language in their daily life with kannada speakers.
		CO5	To speak in polite conservation
ABILITY ENHANCE MENT	21ME482	CO1	Demonstrate proficiency in handling of loops and creation of functions.
		CO2	Identify the methods to create and manipulate lists, tuples and dictionaries.

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		CO3	Discover the commonly used operations involving regular expressions and file system.
		CO4	Examine working of PDF and word file formats
Ability Enhancement Course – III	21ME481	CO1	Use derivatives and partial derivatives to calculate the rate of change of multivariate functions.
		CO2	Apply concepts of complex numbers and vector algebra to analyse the problems arising in a related area.
		CO3	Analyse position, velocity and acceleration in two and three dimensions of vector-valued functions.
		CO4	Learn techniques of integration including the evaluation of double and triple integrals.
		CO5	Identify and solve first-order ordinary differential equations.
COMPLEX ANALYSIS, PROBABILITY AND LINEAR PROGRAMMING.	BSC 21ME41	CO1	Understand the concepts of Complex variables, Complex integration, Probability distributions, Linear Programming problems and Transport & Assignment problems.
		CO2	Demonstrate various physical phenomena using the concepts of Complex variables, Complex integration, Probability distributions, Linear Programming problems and Transport & Assignment problems.
		CO3	Apply the knowledge of Complex variables, Complex integration, Probability distributions, Linear Programming problems and Transport & Assignment problems in modeling various physical and engineering phenomena.
		CO4	Relate the concepts of Complex variables, Complex integration, Probability distributions, Linear Programming problems and Transport & Assignment problems in various engineering problems related to the ME and allied engineering branches.
MACHINING SCIENCE AND JIGS & FIXTURES	21ME42	CO1	Demonstrate the Conventional, CNC machines and advanced manufacturing process operations.
		CO2	Determine tool life, cutting force, and economy of the machining process.
		CO3	Analyze the influence of various parameters on machine tools' performance.
		CO4	Select the appropriate machine tools and process, the Jigs, and fixtures for various applications.
FLUID MECHANICS	21ME43	CO1	Understand the basic principles of fluid mechanics and fluid kinematics
		CO2	Acquire the basic knowledge of fluid dynamics and flow measuring instruments

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		CO3	Understand the nature of flow and flow over bodies and the dimensionless analysis
		CO4	Acquire the compressible flow fundamental and basics of CFD packages and the need for CFD analysis.
		CO5	Conduct basic experiments of fluid mechanics and understand the experimental uncertainties.
MECHANICS OF MATERIALS	21ME44	CO1	Elastic Properties of Materials, Different types of stress due to application of loads on structural members and strain energy stored in structural members.
		CO2	Comprehend the stress and strain relations, Shear force and Bending moment relations
		CO3	Describe Load carrying capacity of torsional members and columns and the theories of failures
		CO4	Compute the stresses, strains and strain energy in bars and beams
		CO5	Calculate stresses in shafts and cylinders, Stability of Columns
BIOLOGY FOR ENGINEERS	21BE45	CO1	Interdisciplinary applications of bio-molecules by exploiting its molecular properties
		CO2	Compare the working human organs to known equipment's/machineries
		CO3	Relate various technologies on the principles of biomechanics
		CO4	Evaluate the design of bioengineering used in solution of contemporary problems
MECHANICAL MEASUREMENTS AND METROLOGY LAB	PCC 21MEL46	CO1	Gain knowledge on how to use different metrology measuring instruments.
		CO2	Understand and demonstrate different measuring instruments
		CO3	Illustrate the measurement of force, torque, pressure, strain, temperature, screw and gear profile etc.,
ABILITY ENHANCEMENT	21ME481	CO1	Use Excel functions and charts for a wide range of calculations and data manipulations.
		CO2	Solve matrix operations, regression analysis and iterative solutions.
		CO3	Develop macros with the assistance of user-defined functions, subroutines, and VBA structures to solve approximate methods

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ADDITIONAL MATHEMATICS –	21ME482	CO1	Test for consistency and solve the system of linear equations
		CO2	Solve higher order differential equations
		CO3	Apply elementary probability theory and solve related problems
		CO4	To interpolate/extrapolate from the given data
		CO5	Apply the knowledge of numerical methods in modelling and solving engineering problems
THEORY OF MACHINES	21ME51	CO1	Apply graphical and analytical methods to examine kinematic chains and inversions to determine velocity and acceleration
		CO2	Apply graphical and analytical methods to find static and dynamic forces within the four-bar and slider crank mechanisms and analyze the size of flywheels
		CO3	Apply principles of gear trains to determine power transmission in both spur gears and epicyclic gears.
		CO4	Apply principles of balancing of forces to find the balancing of rotating and reciprocating masses and also study stability of centrifugal governors
		CO5	Apply vibrations principles to solve mechanical vibration problems using equilibrium methods and D'Alembert's principle.
THERMO-FLUIDS	21ME52	CO1	Illustrate the IC Engines and Reciprocating compressor
		CO2	Explain the application of RAC in HVAC
		CO3	Describe the concept of turbomachines and positive displacement machines
		CO4	Working of the Hydraulic turbines and centrifugal pumps
		CO5	Illustrate the working of power absorbing machines and steam turbines
		CO6	Demonstrate and infer the results
		CO7	Evaluate the performance and demonstrate the experiments
FINITE ELEMENT ANALYSIS	21ME53	CO1	State and Describe - Principles of energy methods, stress conditions and finite element method.
		CO2	Derivation of shape functions & stiffness matrices for different finite elements
		CO3	Develop- Stiffness matrix and Load vector of bar, Truss, Beams, Conduction elements

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		CO4	Solve - Problems on Bar, Truss, Beams, Heat Transfer, Numerical Integration
MODERN MOBILITY AND	21ME54	CO1	Understand the different chassis design & main components of automobile
		CO2	Describe the working of transmission and control system employed in automobiles
		CO3	Analyse the automotive pollution and alternative automotive technologies under trail
		CO4	Explain the upcoming electric vehicle technology
DESIGN LAB	21MEL55	CO1	Compute the natural frequency of the free and forced vibration of single degree freedom systems,critical speed of shafts.
		CO2	Carry out balancing of rotating masses and gyroscope phenomenon
		CO3	Analyse the governor characteristics
		CO4	Determine stresses in disk, beams and plates using photo elastic bench
		CO5	Determination of Pressure distribution in Journal bearing
		CO6	Analyse the stress and strains using strain gauges in compression and bending test
		CO7	To realize different mechanisms and cam motions.
RESEARCH METHODOLOGY &	21ME56	CO1	To Understand the knowledge on basics of research and its types.
		CO2	To Learn the concept of Literature Review, Technical Reading, Attributions and Citations.
		CO3	To learn Ethics in Engineering Research.
		CO4	To Discuss the concepts of Intellectual Property Rights in engineering.
ENVIRONMENTAL STUDIES	21CIV57	CO1	Gain knowledge of Ecology, Environment, Environmental policies and regulations, Clean Energy sources, Natural resource management and sustainability
		CO2	Understand the factors causing pollution to Water, Soil, Noise and Air and their Global Environmental Concerns.
ABILITY ENHANCEMENT	21ME581	CO1	Able to implement loops, branching, control instruction and functions in MATLAB programming environment.
		CO2	Able to program curve fitting, numerical differentiation and integration, solution of linear equations in MATLAB and solve electrical engineering problems.

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		CO3	Able to understand implementation of ODE using ode 45 and execute Solutions of nonlinear equations and DFT in MATLAB.
		CO4	Able to simulate MATLAB Simulink examples
PRODUCTION AND OPERATIONS MANAGEMENT	HSMC 21ME61	CO1	Summarize the various parameters affecting productivity.
		CO2	Apply techniques to forecast the sales and demand for an organization.
		CO3	Determine the importance of capacity and location planning to find the optimum solution to meet the forecasted demand of an organization.
		CO4	Interpret the various techniques for aggregate planning and master production scheduling.
		CO5	Identify MRP, ERP and SCM evaluation techniques to find optimal requirement.
HEAT TRANSFER	21ME62	CO1	Solve steady state heat transfer problems of conduction in various coordinate systems and composites.
		CO2	Determine the fins efficiency in steady-state conduction and the use Heister's charts in transient heat transfer problems
		CO3	Apply numerical methods for heat conduction and determine heat transfer in radiation.
		CO4	Solve free and forced convection problems in heat transfer.
		CO5	Determine the performance of a heat exchangers and describe the mechanisms of boiling and condensation
		CO6	Determine the coefficients of thermal in different modes heat transfer.
		CO7	Calculate the effectiveness on a metallic fin, Emissivity of a Surface.
MACHINE DESIGN	21ME63	CO1	Apply failure theories and material properties to determine the performance of machine components under varied loading conditions
		CO2	Apply mechanical design principles to design shafts, couplings, and springs, subjecting to static and dynamic loads meeting the standards
		CO3	Analyze riveted, welded, and threaded joints under different loads, summarizing their engineering applications.
		CO4	Apply engineering principles to design spur, helical, bevel, and worm gears, incorporating strength, dynamic loading and wear.

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		CO5	Apply engineering knowledge and principles for the selection of clutch, brake and bearings to meet design
CNC PROGRAMMING AND 3-D	21ME64	CO1	Able to write CNC part programs using CADEM simulation packagefor simulation of machining operations such as Turning, Drilling & Milling.
		CO2	Able to understand write programs for Flexible Manufacturing Systems Robotics. Application
		CO3	Able to understand the operating principles of hydraulics, pneumatics and electro–pneumatic systems
MINI PROJECT	21MEMP 67	CO1	Demonstrate an ability to identify and formulate a hypothesis for a given problem and test through appropriate experiments.
		CO2	Apply relevant modern tools to solve the identified technical problem.
		CO3	Analyse and evaluate the experimental results and propose suitable modifications to improve performance.
		CO4	Work effectively as a member or a leader of a team.
		CO5	Communicate technical content effectively through written reports and oral presentations.
AUTOMATION AND ROBOTICS	21ME71	CO1	Discuss the Parts and benefits of automation and its applications.
		CO2	Analyse the types of automation and automatic identification methods.
		CO3	Discuss various parts in industrial robots and their functions.
		CO4	Explain the basic principles of Robotic technology, configurations, control of Robots
		CO5	Explain the basic principles of programming and apply it for typical Pick & place, Loading & unloading and palletizing applications.
CONTROL ENGINEERING	21ME72	CO1	Identify the type of control system and control actions and develop the mathematical model of the physical systems.
		CO2	Estimate the response and error in response of first and second order systems subjected standard input signals.
		CO3	Represent the complex physical system using block diagram and signal flow graph and obtain transfer function
		CO4	Analyse a linear feedback control system for stability using Hurwitz criterion, Routh's criterion and root Locus technique in complex domain.

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		CO5	Analyse the stability of linear feedback control systems in frequency domain using polar plots, Nyquist and Bode plots.
ADDITIVE MANUFACTURING	21ME731	CO1	Understand the different process of Additive Manufacturing. devices, capabilities and materials that are available.
		CO2	Analyse the various software tools, printing processes, post processing techniques that enable advanced/additive manufacturing.
		CO3	Apply the concepts of additive manufacturing to design and create components that satisfy product development/prototyping requirements, using advanced/additive manufacturing devices and processes.
		CO4	Describe the guidelines for Process Selection, Software issues for AM and Post- Processing.
		CO5	Summarize the applications of additive manufacturing based on the material requirements and current trends.
TOTAL QUALITY MANAGEMENT	21ME732	CO1	Explain the various approaches of TQM.
		CO2	Infer the customer perception of quality.
		CO3	Analyse customer needs and perceptions to design feedback systems.
		CO4	Apply statistical tools for continuous improvement of systems.
		CO5	Apply the tools and technique for effective implementation of TQM.
PRODUCT DESIGN AND ERGONOMICS	21ME744	CO1	To learn the concept of product design and the ergonomics.
		CO2	Design the various controls and displays by knowing the anthropometric data's.
		CO3	To learn the psychology of visuals effects.
		CO4	Learning the different colour combinations for optimal design of engineering equipment's.
		CO5	Realize the importance of environmental factors and aesthetics in industrial design.
NON TRADITIONAL MACHINING	OE	CO1	Describe the differences between traditional and non-traditional machining techniques, practical applications and limitations.
		CO2	Illustrate the principles, effect of process parameters, merits and demerits of ultrasonic machining and

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			Abrasive Jet machining
		CO3	Understand the principles performance characteristics of chemical and electro chemical machining techniques.
		CO4	Comprehend the concept and importance of process parameters in electrical discharge machining and Plasma arc machining
		CO5	Understand the basic process of metal removal and recognize the constraints of laser beam machining and electron beam machining.
PROJECT WORK	21MEP76	CO1	Demonstrate an ability to identify and formulate a hypothesis for a chosen problem and to test through appropriate experiments
		CO2	Apply relevant modern tools/techniques to solve the chosen problem.
		CO3	Analyse/Infer/Evaluate the experimental results and propose suitable modifications to improve performance.
		CO4	Work effectively as a member or a leader of a team.
		CO5	Communicate effectively through written report and oral presentations
TECHNICAL SEMINAR	21ME81	CO1	Select recent advances in a specific technical field by performing a comprehensive literature survey.
		CO2	Compare the different solution methods, various software tools and methods for the identified problem
		CO3	Discuss the advantages and disadvantages of approach, along with possible future directions.
		CO4	Communicate technical content effectively through written and oral presentations
RESEARCH INTERNSHIP/ INDUSTRY INTERNSHIP	21INT82	CO1	Demonstrate Sound technical Knowledge in the chosen domain through Skill up gradation.
		CO2	Correlate the knowledge gained for different applications scenarios.
		CO3	Work as individual or as good team player in an organization.
		CO4	Communicate technical content effectively through written and oral presentations

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2018 SCHEME

Course Name	Course Code	CO. No.	Course Outcomes
TRANFORM CALCULUS, FOURIER SERIES & NUMERICAL TECHNIQUES	18MAT31	CO1	Have The Knowledge Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Calculus Of Variations And Numerical Methods.
		CO2	Solve Engineering Problems Using Laplace Transforms, Fourier Series, Fourier Transforms, Numerical Methods And Calculus Of Variation.
		CO3	Communicate And Reflect On Applications Of Mathematics As Tool.
MECHANICS OF MATERIALS	18ME32	CO1	Able to define Elastic Properties of Materials, Different types of stress due to application of loads and energy stored in various structural members.
		CO2	Able to comprehend the relation for stress and strain distribution, Shear force and Bending moment diagram, Torque and stability of columns from failure theories
		CO3	Able to apply the known and comprehended concepts and to calculate the stresses, strains and strain energy in Bars, Cylinders, Beams, Shafts, and Columns.
		CO4	Able to analyze the stresses and strains for plane stress condition analytically and graphically for structural members and analyze stress distribution for thick and thin cylinders
BASIC THERMODYNAMICS	18ME33	CO1	Able to learn about the fundamentals of energy interactions, laws of thermodynamics along with various processes involved and properties.
		CO2	Able to understand and obtain the relationship between different temperature scale, energy and its property.
		CO3	Able to apply conservation of energy, the laws of thermodynamics in various systems.
MATERIALS SCIENCE	18ME34	CO1	Able to understand the properties of engineering materials and their behaviour
		CO2	Able to describe the procedure of heat treatment and processing of composite materials
		CO3	Able to understand the potentialities of various materials and material selection procedure
METAL CASTING AND WELDING	18ME35A	CO1	Able to gain Knowledge about casting, welding, soldering brazing process and solidification
		CO2	Able to describe molds, castings, welding, solidification process, inspection methods and furnaces. Also describe soldering, brazing methodologies.
		CO3	Able to apply different casting, joining and inspection methods depending on requirement.

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Course	Code	CO	Outcome
COMPUTER AIDED MACHINE DRAWING	18ME36A	CO1	Able to draw orthographic projections and sectional views of standard primitives and Machine components.
		CO2	Able to draw orthographic projections of standard thread forms, joints and couplings.
		CO3	Able to create/model parts and assembly of machine components using Solid edge.
MATERIALS TESTING LAB	18MEL37A	CO1	Able to gain knowledge to conduct material tests to find different material properties. Also to gain knowledge about the heat treatment processes and non- destructive tests.
		CO2	Able to understand and demonstrate different microstructures of the material.
		CO3	Able to implement different strength and characteristic tests of a material depending on the application.
FOUNDRY AND FORGING LAB	18MEL38B	CO1	Able to have the Knowledge on the preparation of foundry sand and its testing, understanding on basic foundry and forging operations along with the tools involved in each of the process
		CO2	Able to describe different parameters involved in sand moulding, identify the importance of sand testing and its effects on the final quality of the mould.
		CO3	Able to perform basic foundry and forging operations to obtain the desired shapes and with the prescribed quality.
		CO4	Able to compare and Analyse the effect of sand and its composition on the strength of the mould using various testing procedures.
APPLIED THERMODYNAMICS	18ME42	CO1	Able to outline the Gas power cycles, vapour power cycles and know how fuel burns and their thermodynamic properties.
		CO2	Able to explain the performance and mechanisms of gas power cycle, steam power cycle and refrigeration system
		CO3	Able to compute the performance of gas power plant, steam power plant, IC Engine, Reciprocating compressors and refrigeration system.
FLUID MECHANICS	18ME43	CO1	Able to understand the basics of fluid properties, statics, dynamics, kinematics, concept of boundary layer in fluid flow as well as CFD
		CO2	Able to explain the principle of buoyancy and flotation, laminar and turbulent flow, flow across body and checking dimensional homogeneity
		CO3	Able to calculate the key fluid properties, meta centric height, lift, drag and applying Bernoulli's equation to devices

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KINEMATICS OF MACHINERY	18ME44	CO1	Able to illustrate the terminology of mechanisms
		CO2	Able to identify the degrees of freedom and motion characteristics of planar mechanisms.
		CO3	Able to predict the motion of planar mechanisms graphically and mathematically.
		CO4	Able to describe the characteristics of motion in gears with involute profile
		CO5	Able to calculate the velocity ratio or number of teeth for an epicyclic gear train drive.
		CO6	Able to draw the profile of the cam for a desired follower motion.
METAL CUTTING AND FORMING	18ME45A	CO1	Describe various cutting tool materials, machine tools, machining processes and metal forming processes.
		CO2	Explain the mechanism of machining processes, cutting tool materials, tool nomenclature, tool wear, tool life and economics of machining processes and metal forming processes.
		CO3	Estimate the effect of machining processes and parameters on surface finish, tool wear, tool life, machining efficiency and to estimate the effect of different forces acting on the dies during sheet metal operations.
MECHANICAL MEASUREMENTS AND		CO1	Define terms associated to metrology, measurements, measuring equipment's.
		CO2	Explain different measuring instruments and their utilization.
		CO3	Illustrate the measurement of force, torque, pressure, strain, temperature, screw and gear profile.
WORK SHOP AND MACHINE SHOP	18MEL48B	CO1	Able to describe and demonstrate machining operations.
		CO2	Able to describe and demonstrate machining operations.
		CO3	Able to illustrate different machining techniques depending on the requirement.
MANAGEMENT AND ECONOMICS	18ME51	CO1	Understand needs, functions, roles, scope and evolution of Management; Importance, purpose of Planning and hierarchy of planning and also analyze its types.
		CO2	Understanding of why economics Is important to engineers, basic interest calculations.
		CO3	Discuss Decision making, Organizing, Staffing, Directing and Controlling
		CO4	How to arrive at the Selling Price of a component, cost components involved in manufacturing product.
		CO5	To evaluate assests/ projects and choose alterntaives based on the investment today.

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DESIGN OF MACHINE ELEMENTS-I	18ME52	CO1	Understand basic of Mechanical Design procedure, material properties and selection of material, codes and standards.
		CO2	Design machine components for static, impact and fatigue strength.
		CO3	Design fasteners, shafts, keys, couplings, riveted and welded joints,
		CO4	Analyze the stress level and deformation in the different parts of the machine components, to determine the dimensions of the component.
DYNAMICS OF MACHINERY	18ME53	CO1	Describe motion, static and dynamic equilibrium conditions for different mechanisms and machine elements.
		CO2	Understand force transmission and balancing in different mechanisms and also principles of vibrations of single degree of freedom mechanical systems.
		CO3	Solve problems on force transmission and balancing in different mechanisms and vibration characteristics of single degree of freedom mechanical systems.
		CO4	Explain force transmission and vibration characteristics in different mechanical systems.
TURBOMACHINES	18ME54	CO1	Able to define basic definitions of turbomachines and sketching of velocity triangles for different flow turbomachines.
		CO2	Able to derive or Obtain expressions for different flow type turbomachines during energy transfer.
		CO3	Able to apply the derived equations and knowledge of turbomachines in solving numerical problems.
FLUID POWER ENGINEERING	18ME55	CO1	Enables to understand the Principle and components of Hydraulic and Pneumatic systems.
		CO2	Enables to understand the working of Hydraulics pumps and motors, able to calculate performance of Pumps and motors.
		CO3	Understand Hydraulic and Pneumatic control components and their graphic symbols
		CO4	Able to design Hydraulic/Pneumatic Circuits. Understand basic fluid power maintenance procedures.
OPERATION MANAGEMENT	18ME56	CO1	Define terminologies and procedures associated with production and operations management principles.
		CO2	Apply operation management technique to solve industrial and managerial related problems.
		CO3	Predict, allocate and schedule the resources in decision making.

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		CO4	Review and evaluate inventory and purchase management decisions
FLUID MECHANICS AND MACHINERY LAB	18MEL57	CO1	Able to define fluid mechanics, fluid and their properties
		CO2	Able to obtain or derive mathematical relation and conduct the experiment
		CO3	Able to calculate the efficiency and discharge by the machineries.
ENERGY LAB	18MEL58	CO1	Able to define basic terms and performance parameters of IC engines
		CO2	Able to write the Procedure of working of various IC engine equipments and measuring apparatus
		CO3	Able to calculate the performance parameters of IC engines, properties of fuel and lubricating oils
FINITE ELEMENT METHOD	18ME61	CO1	Able to know the principles of energy methods, stress conditions and finite element method.
		CO2	Able to Derive shape functions & stiffness matrices for different finite elements.
		CO3	Able to obtain Stiffness matrix and Load vector of bar, Truss, Beams, Conduction elements
		CO4	Able to solve problems on Bar, Truss, Beams, Heat Transfer, Numerical Integration
DESIGN OF MACHINE ELEMENTS II	18ME62	CO1	Able to define stresses in curved beams and springs
		CO2	Able to select the flexible (belt, rope and chain) drives and gears.
		CO3	Able to explain the stresses in curved beams, springs, power transmitting elements and IC engine parts.
		CO4	Able to determine the stresses in curved beams, springs and gears
		CO5	Able to calculate the flexible drive sizes, breaks, clutch, bearings and IC engine parts
HEAT TRANSFER	18ME63	CO1	Able to state the different modes of Heat Transfer.
		CO2	Able to derive the laws from the modes in Heat Transfer.
		CO3	Able to draw/ Apply the heat flow rate and effectiveness of conduction, convection and radiation heat transfer.
NON TRADITIONAL MACHINING	18ME641	CO1	To understand the importance and different types of non-traditional machining methods.
		CO2	Able to explain principle and procedure of various NTM processes.
		CO3	Illustrate the process parameters, limitations, advantages and applications of different NTM processes
COMPOSITE MATERIALS	18ME645	CO1	Understand the Composites materials, and its manufacturing process.

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Course	Code	CO	Description
TECHNOLOGY		CO2	Determine the stress-strain relations for Composites materials and properties of composites materials
		CO3	Acquiring skills in applying the composites for space, automobile, marine, sports, electrical & electronics Engineering field.
COMPUTER AIDED MODELLING AND ANALYSIS LAB	FEA	CO1	Able to finite Element Analysis & Applications.
		CO2	Able to comprehend natural frequency, Damping of single degree of vibrating systems, critical speed of shafts, pressure distribution in journal bearing
		CO3	Able to calculate and interpret stress and strains using strain gauges, photo elastic compression and bending To orient and balance masses rotating in different planes.
		CO4	Able to analyse stress concentration in rectangular plate with hole and to analyse governor equilibrium speed, sensitivity and power.
HEAT TRANSFER LAB	18MEL67	CO1	Able to define basic terms and modes of heat transfer
		CO2	Able to write the Procedure of working of various heat transfer equipments as well as refrigeration and Air conditioning system.
		CO3	Able to calculate the heat transfer rate, heat transfer coefficients and performance of RAC by conducting experiments, also temperature distribution of steady and transient heat conduction using numerical approach.
MINI PROJECT	18MEP68	CO1	Demonstrate an ability to identify and formulate a hypothesis for a chosen problem and to test through appropriate experiments.
		CO2	Apply relevant modern tools/techniques to solve the chosen problem.
		CO3	Analyse/Infer/Evaluate the experimental results and propose suitable modifications to improve performance.
		CO4	Analyse a linear feedback control system for stability using Hurwitz criterion, Routh's Criterion, root Locus technique in complex domain and in frequency domain using polar plots, Nyquist and Bode plots.
CONTROL ENGINEERING	18ME71	CO1	Identify the type of control, control actions and develop the mathematical model of the physical systems.
		CO2	Estimate the response and error in response of first and second order systems subjected to standard input signals.
		CO3	Represent the complex physical system using block diagram and signal flow graph and obtain

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			transfer function.
		CO4	Analyse a linear feedback control system for stability using Hurwitz criterion, Routh's Criterion, root Locus technique in complex domain and in frequency domain using polar plots, Nyquist and Bode plots.
COMPUTER AIDED DESIGN AND MANUFACTURING	18ME72	CO1	Able to define Automation, CIM, CAD, CAM, CNC, CNC program, Robotic systems, Additive manufacturing, Industry 4.0 and IOT.
		CO2	Able to explain the basics of automated manufacturing industries through mathematical models and categorize different types of automated flow lines, robotic systems, additive manufacturing techniques.
		CO3	Able to execute programs for various manufacturing processes and robot programming.
		CO4	Able to analyse the automated flow lines to reduce time and enhance productivity.
AUTOMATION AND ROBOTICS	18ME732	CO1	Discuss the benefits of automation and its applications.
		CO2	Explain the basic principles of robotic technology, configurations, control, and programming of robots.
		CO3	Explain the basic principles of programming and apply them to typical pick & place, loading & unloading and palletizing applications.
ADDITIVE MANUFACTURING	18ME741	CO1	Understand the different process of Additive Manufacturing. using Polymer, Powder and Nano materials manufacturing.
		CO2	Analyse the different characterization techniques.
		CO3	Describe the various NC, CNC machine programing and Automation techniques.
COMPUTER INTEGRATED MANUFACTURING LAB	18MEL76	CO1	Able to write CNC part programs using CADEM simulation package for simulation of machining operations such as Turning, Drilling & Milling.
		CO2	Able to understand write programs for Flexible Manufacturing Systems Robotics.
		CO3	Able to understand the operating principles of hydraulics, pneumatics and electro– pneumatic systems.
DESIGN LAB	18MEL77	CO1	Able to identify the longitudinal and Torsional single degree of vibrating systems, also to identify different types of Governors, Gyroscope.
		CO2	Able to comprehend natural frequency, Damping of single degree of vibrating systems, critical speed of shafts, pressure distribution in journal bearing

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		CO3	Able to calculate and interpret stress and strains using strain gauges, photo elastic compression and bending and to orient and balance masses rotating in different planes.
		CO4	Able to analyse stress concentration in rectangular plate with hole and to analyse governor equilibrium speed, sensitivity and power.
PROJECT WORK PHASE-1	18MEP78	CO1	Demonstrate an ability to identify and formulate a hypothesis for a chosen problem and to test through appropriate experiments.
		CO2	Apply relevant modern tools/techniques to solve the chosen problem.
		CO3	Analyse/Infer/Evaluate the experimental results and propose suitable modifications to improve performance.
		CO4	Work effectively as a member or a leader of a team.
		CO5	Communicate effectively through written report and oral presentations.
ENERGY ENGINEERING	18ME81	CO1	Able to Enable to comprehend the knowledge of fundamentals of power plants.
		CO2	Able to understand various parameters related to the power plants.
		CO3	Able to understand the mathematical relationship with respect to Economic Analysis of power plants.
NON DISTRUCTIVE TESTING	18ME823	CO1	Understand the importance and different types of Non-Destructive Methods
		CO2	Explain principle and procedure of various NDT processes
		CO3	Illustrate the process parameters ,limitations, advantages and applications of different NDT processes
AUTOMOBILE ENGINEERING	18ME824	CO1	Identifying different parts of an automobile and it's working principle of transmission and braking systems
		CO2	Comprehend the working of steering and suspension systems
		CO3	Learn various types of fuels, injection systems and cause & effect of automobile emissions.
PROJECT WORK PHASE-2	18MEP83	CO1	Demonstrate an ability to identify and formulate a hypothesis for a chosen problem and to test through appropriate experiments.
		CO2	Apply relevant modern tools/techniques to solve the chosen problem.

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		CO3	Analyse/Infer/Evaluate the experimental results and propose suitable modifications to improve performance.
		CO4	Work effectively as a member or a leader of a team.
		CO5	Communicate effectively through written report and oral presentations.
TECHNICAL SEMINAR	18MES84	CO1	Select recent advances in a specific technical field by performing a comprehensive literature survey.
		CO2	Compare the different solution methods, various software tools and methods for the identified problem.
		CO3	Discuss the advantages and disadvantages of approach, along with possible future directions.
		CO4	Communicate technical content effectively through written and oral presentations
INTERNSHIP	18MEI85	CO1	Demonstrate Sound technical Knowledge in the chosen domain through Skill up gradation.
		CO2	Correlate the knowledge gained for different applications scenarios.
		CO3	Work as individual or as good team player in an organization.
		CO4	Communicate technical content effectively through written and oral presentations.