Course Outcomes (COs)

Department of Mechanical Engineering

Programme Name : B.E.-Mechanical Engineering

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2022 Scheme (UG)

Department of Mechanical Engineering

Course Outcomes of First -Year Courses

Course Name	Mathematics-I For Mechanical Engineering Stream
Course Code	BMATM101
Course outcomes (COs): At the end of the course the student will be able to:	
BMATM101.1	Illustrate the concepts of - Polar Curves, Series expansion, Indeterminate forms, Partial differentiation, ODE of first& higher order and Linear algebra.
BMATM101.2	Applying the above acquired knowledge to solve the problems of Mechanical engineering applications.
BMATM101.3	Analyze the solutions of the real-world problems using the appropriate techniques and optimize the solutions.
BMATM101.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	Mathematics-II For Mechanical Engineering Stream
Course Code	BMATM201
Course outcomes (COs): At the end of the course the student will be able to:	
BMATM201.1	Illustrate the concepts of - Multiple & Improper Integrals, Vector Calculus, PDE and Numerical Techniques.
BMATM201.2	Apply the above acquired knowledge to solve the problems of Mechanical and allied engineering.
BMATM201.3	Analyse the solutions of the real-world problems using the appropriate techniques and optimize the solutions.
BMATM201.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	Physics for ME Stream
Course Code	BPHYM102/202
Course outcomes (COs): At the end of the course the student will be able to:	
BPHYM102/202.1	Elucidate concepts in oscillations, waves, elasticity, thermoelectric materials and generation of low temperature.
BPHYM102/202.2	Analyze applications of oscillations, waves, elasticity, thermoelectric materials and cryogenics.
BPHYM102/202.3	Explain the various material characterization technique
BPHYM102/202.4	Practice working in groups to conduct experiments, solving numerical problems and perform precise and honest measurements.

Course Name	Chemistry for ME stream
Course Code	BCHEM102/202
Course outcomes (COs): At the end of the course the student will be able to:	
BCHEM102/202.1	Identify the terms and processes involved in scientific and engineering applications
BCHEM102/202.2	Explain the phenomena of chemistry to describe the methods of engineering processes
BCHEM102/202.3	Solve for the problems in chemistry that are pertinent in engineering applications
BCHEM102/202.4	Apply the basic concepts of chemistry to explain the chemical properties and processes. Analyze properties and processes associated with chemical substances in multidisciplinary situations

Course Name	Elements of Mechanical Engineering
Course Code	BEMEM 103/203
Course outcomes (COs): At the end of the course the student will be able to:	
BEMEM103/203.1	Understand the basic concepts of mechanical engineering in the fields of energy, materials and manufacturing.
BEMEM103/203.2	Explain and summarize the application of energy utilization, materials, manufacturing techniques, steam, heat transfer and robotics.
BEMEM103/203.3	Apply the concepts of energy utilization, power transmission, modern materials usage & machining and apply the skills in developing simple mechanical elements & processes
BEMEM103/203.4	Analyze the condition of steam and its energy, performance parameters of IC engines, velocity ratio and power transmitted through power transmission systems

Course Name	Introduction to Mechanical Engineering
Course Code	BESCK104D-204D
Course outcomes (COs): At the end of the course the student will be able to:	
BESCK104D/204D.1	Understand the basic concepts of mechanical engineering in the fields of energy, materials and manufacturing.
BESCK104D/204D.2	Explain the application of energy utilization, manufacturing techniques, and CNC machines.
BESCK104D/204D.3	Illustrate the Working principle of IC Engines, electric vehicles, robotics and IoT.
BESCK104D/204D.4	Summarize the application of modern materials usage, IC Engines, electric vehicles, robotics and IoT.

Course Outcomes of Second-Year Courses

Course Name	Mechanics of Materials
Course Code	BME301
Course outcomes (COs): At the end of the course the student will be able to:	
BME301.1	Understand the concept of stress and strain in structural problems.
BME301.2	Apply the concept of different elastic functions, stress and strain to solve structural problems.
BME301.3	Analyze the influence of various geometric and loading parameters in axial, bending, shear and torsion.
BME301.4	Analyze the concept of solid mechanics in designing structural members.

Course Name	Manufacturing Process
Course Code	BME302
Course outcomes (COs): At the end of the course the student will be able to:	
BME302.1	Understand the concepts of metal casting, forming and welding
BME302.2	Assess, compare and select appropriate manufacturing Processes.
BME302.3	Apply principles of casting, forming and welding to specific applications.
BME302.4	Adapt the principles of manufacturing Processes to develop the mechanical components.

Course Name	Material Science and Engineering
Course Code	BME303
Course outcomes (COs): At the end of the course the student will be able to:	
BME303.1	Understand behavior of various materials with respect to crystal structure, mechanical behavior, phase transformation and corrosion.
BME303.2	Identify suitable materials for specific engineering applications.
BME303.3	Investigate mechanical properties and microstructures of different materials.
BME303.4	Analyze materials crystal structure, mechanical behavior, phase transformation and corrosion, composition and their phase transformation.

Course Name	Basic Thermodynamics
Course Code	BME304
Course outcomes (COs): At the end of the course the student will be able to:	
BME304.1	Describe the fundamental concepts and principles of engineering thermodynamics.
BME304.2	Understand the thermodynamic relations for different engineering applications.
BME304.3	Apply the governing laws of thermodynamics for different engineering applications.
BME304.4	Analyze the various thermodynamic system and processes.

Course Name	Introduction to Modelling and Design for Manufacturing
Course Code	BMEL305
Course outcomes (COs): At the end of the course the student will be able to:	
BMEL305.1	Demonstrate Engineering visualization skills
BMEL305.2	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.
BMEL305.3	Produce the assembly drawings using part drawings.
BMEL305.4	Engage in lifelong learning using sketching and drawing as a communication tool.

Course Name	Applied Thermodynamics
Course Code	BME401
Course outcomes (COs): At the end of the course the student will be able to:	
BME401.1	Explain thermodynamic cycles/ relations for thermal engineering applications to find work and efficiency/performance.
BME401.2	Apply the laws of thermodynamics to determine the performance parameters of thermal engineering applications
BME401.3	Solve thermal engineering problems using thermodynamic relations and charts
BME401.4	Analyse modifications of basic thermodynamic cycles for optimizing work and Increasing efficiency/ performance of thermal engineering applications

Course Name	Machining Science & Metrology
Course Code	BME402
Course outcomes (COs): At the end of the course the student will be able to:	
BME402.1	Understand the use of Conventional, CNC machines and advanced manufacturing process operations with different tools and with suitable cutting fluids and jigs and fixtures.
BME402.2	Apply and choose different machining techniques, tools, cutting tools, and jigs and fixtures.
BME402.3	Analyze the influence of various parameters on machine tools' performance.
BME402.4	Understand the objectives of metrology, methods & standards of measurements and various measurement parameters.

Course Name	Fluid Mechanics
Course Code	BME403
Course outcomes (COs): At the end of the course the student will be able to:	
BME403.1	Describe the fundamental concepts and principles of fluid mechanics and machinery.
BME403.2	Understand the fluid dynamics relations for different engineering applications.
BME403.3	Apply the governing laws of fluid mechanics for different engineering applications.
BME403.4	Analyze the various fluid flow processes and turbomachines.

Course Name	Mechanical Measurements and Metrology
Course Code	BME404
Course outcomes (COs): At the end of the course the student will be able to:	
BME404.1	Define the Basic principles that govern the working of the measuring instruments.
BME404.2	Demonstrate proficiency in applying principles of Mechanical Measurements & Metrology in laboratory settings.
BME404.3	Utilize experimental techniques to demonstrate advanced proficiency in applying theoretical concepts to practical scenarios.
BME404.4	Analyze and examine measurement precision and accuracy in the Mechanical Measurements & Metrology laboratory, drawing meaningful conclusions about their reliability.

2021 Scheme (UG)

Course Outcomes of First-Year Courses

Course Name	Elements of Mechanical Engineering
Course Code	21EME15/25
Course outcomes (COs): At the end of the course the student will be able to:	
21EME15/25.1	Remember and understand the basic concepts of mechanical engineering in the fields of energy, materials and manufacturing.
21EME15/25.2	Explain and summarize the application of energy utilization, materials, manufacturing techniques, steam, heat transfer and robotics
21EME15/25.3	Apply the concepts of energy utilization, power transmission, modern materials usage & machining and apply the skills in developing simple mechanical elements & processes
21EME15/25.4	Evaluate and analyze the various dimensions and parameters of steam, IC engine belt drive, gear drive, machine tools

Course Name	Engineering Visualization
Course Code	21EVN15/25
Course outcomes (COs): At the end of the course the student will be able to:	
21EVN15/25.1	Understand and visualize the objects with definite shape and dimensions
21EVN15/25.2	Develop the visualization drawings of various engineering objects
21EVN15/25.3	Analyze the shape and size of objects through different views.
21EVN15/25.4	Create engineering drawing as per BIS convention.

Course Outcomes of Second-Year Courses

Course Name	Transform Calculus, Fourier Series and Numerical Techniques
Course Code	21MAT31
Course outcomes (COs): At the end of the course the student will be able to:	
21MAT31.1	Illustrate the concepts of– Laplace, Fourier & Z transformation, Fourier series, Numerical solutions of PDE & ODE and Calculus of variation .
21MAT31.2	Apply the above acquired knowledge to solve the problems in engineering.
21MAT31.3	Analyze the solutions of the real-world problems using above techniques.
21MAT31.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	Metal casting, Forming and Joining Processes
Course Code	21ME32
Course outcomes (COs): At the end of the course the student will be able to:	
21ME32.1	Understand the concepts of metal casting, forming, welding, and metal cutting.
21ME32.2	Assess, compare, and select appropriate manufacturing Processes.
21ME32.3	Apply casting, forming, welding, and metal cutting principles to specific applications.
21ME32.4	Adapt the principles of manufacturing Processes to develop the mechanical components.

Course Name	Material Science and Engineering
Course Code	21ME33
Course outcomes (COs): At the end of the course the student will be able to:	
21ME33.1	Understand behavior of various materials with respect to crystal structure, mechanical behavior, phase transformation and corrosion.
21ME33.2	Identify suitable materials for specific engineering application
21ME33.3	Investigate mechanical properties and microstructures of different materials
21ME33.4	Analyze materials, composition and their phase transformation.

Course Name	Thermodynamics
Course Code	21ME34
Course outcomes (COs): At the end of the course the student will be able to:	
21ME34.1	Describe the fundamental concepts and principles of engineering thermodynamics.
21ME34.2	Understand the thermodynamic relations for different engineering applications.
21ME34.3	Apply the governing laws of thermodynamics for different engineering applications.
21ME34.4	Analyze the various thermodynamic processes, cycles and results.

Course Name	Machine Drawing and GD & T
Course Code	21MEL35
Course outcomes (COs): At the end of the course the student will be able to:	
21MEL35.1	Interpret the Machining and surface finish symbols on the component drawings.
21MEL35.2	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.
21MEL35.3	Illustrate various machine components through drawings.
21MEL35.4	Create assembly drawings as per the conventions.

Course Name	Additional Mathematics-I
Course Code	21MATDIP31
Course outcomes (COs): At the end of the course the student will be able to:	
21MATDIP31.1	Illustrate the concepts of– Differentiation, Series expansion, Partial differentiation, Complex numbers, Vector algebra & differentiation, Integral calculus and ODE of first order.
21MATDIP31.2	Apply the above acquired knowledge to solve the problems in engineering.
21MATDIP31.3	Analyze the solutions of the real-world problems using the above suitable techniques.
21MATDIP31.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	Complex Analysis, Probability and Linear Programming
Course Code	21MATME41
Course outcomes (COs): At the end of the course the student will be able to:	
21MATME41.1	Illustrate the concepts of– Complex functions, transformation, Probability distributions and Optimization techniques
21MATME41.2	Apply the above acquired knowledge to solve the problems in mechanical and allied branches of engineering.
21MATME41.3	Analyze the solutions of the real world problems using above techniques.
21MATME41.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	Machining Science and Jigs & Fixtures
Course Code	21ME42
Course outcomes (COs): At the end of the course the student will be able to:	
21ME42.1	Understand the use of Conventional, CNC machines and advanced manufacturing process operations with different tools and with suitable cutting fluids and jigs and fixtures.
21ME42.2	Apply and choose different machining techniques, tools, cutting tools, and jigs and fixtures.
21ME42.3	Analyze the influence of various parameters on machine tools' performance.
21ME42.4	Relate the appropriate machine tools and process, the Jigs, and fixtures for various applications.

Course Name	Fluid Mechanics and Machinery
Course Code	21ME43
Course outcomes (COs): At the end of the course the student will be able to:	
21ME43.1	Understand the fluid properties and fluid mechanics theoretically as well as practically for different engineering applications.
21ME43.2	Apply the principles of fluid mechanics to related engineering problems and understand them practically.
21ME43.3	Solve the fluid mechanics problems by using different relations.
21ME43.4	Analyze the various fluid mechanics and dynamics results with practical implications.

Course Name	Mechanics of Materials
Course Code	21ME44
Course outcomes (COs): At the end of the course the student will be able to:	
21ME44.1	Understand simple, compound, thermal stresses, strains and their relations and strain energy.
21ME44.2	Analyse structural members for stresses, strains and deformations.
21ME44.3	Analyse the structural members subjected to bending, twisting and shear loads.
21ME44.4	Analyse the short columns for stability

Course Name	Mechanical Measurements & Metrology Laboratory
Course Code	21MEL46
Course outcomes (COs): At the end of the course the student will be able to:	
21MEL46.1	Explain the application of quality standards to engineering products in industries.
21MEL46.2	Apply quality control processes within industries to ensure product quality.
21MEL46.3	Analyze surface roughness measurements and conduct alignment tests.
21MEL46.4	Create designs for specialized instrumentation and devices.

Course Name	Additional Mathematics-II
Course Code	21MATDIP41
Course outcomes (COs): At the end of the course the student will be able to:	
21MATDIP41.1	Illustrate the fundamental concepts of -- Linear Algebra, , higher order ODE, Probability and Numerical Methods .
21MATDIP41.2	Apply the above acquired knowledge to solve the problems in engineering.
21MATDIP41.3	Analyze the solutions of the real world problems using above suitable techniques.
21MATDIP41.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Outcomes of Third -Year Courses

Course Name	Theory of Machine
Course Code	21ME51
Course outcomes (COs): At the end of the course the student will be able to:	
21ME51.1	Identify and enumerate different link-based mechanisms with basic understanding of motion.
21ME51.2	Understand the causes and effects of vibration in mechanical systems.
21ME51.3	Develop schematic models for physical systems and formulate governing equations of motion and vibrations.
21ME51.4	Analyze the mathematical models and to determine its response of real-life engineering systems

Course Name	Thermo-fluids Engineering
Course Code	21ME52
Course outcomes (COs): At the end of the course the student will be able to:	
21ME52.1	Explain the fundamental principles of internal combustion engines, refrigerators and turbo machines.
21ME52.2	Apply the knowledge of IC engines, refrigerators and turbo machines to analyse and design various thermos-fluids systems, using relevant data and charts.
21ME52.3	Analyse the operation, efficiencies, and characteristics of IC engines, refrigerators and different turbomachines.
21ME52.4	Evaluate the performance characteristics of IC engines, refrigerators, centrifugal fans, blowers, compressors, and steam/gas turbines.

Course Name	Finite Element Analysis
Course Code	21ME53
Course outcomes (COs): At the end of the course the student will be able to:	
21ME53.1	Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
21ME53.2	Develop element characteristic equation and generation of global equation.
21ME53.3	Formulate and solve Axi-symmetric and heat transfer problems.
21ME53.4	Apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi-symmetric and dynamic problems.

Course Name	Modern Mobility and Automotive Mechanics
Course Code	21ME54
Course outcomes (COs): At the end of the course the student will be able to:	
21ME54.1	Understand the working of different systems employed in automobile
21ME54.2	Analyze the limitation of present-day automobiles
21ME54.3	Evaluate the energy sources suitability
21ME54.4	Apply the knowledge for selection of automobiles based on their suitability

Course Name	Design lab
Course Code	21ME55
Course outcomes (COs): At the end of the course the student will be able to:	
21ME55.1	Compute the natural frequency of the free and forced vibration of single degree freedom systems, critical speed of shafts.
21ME55.2	Carry out balancing of rotating masses and gyroscope phenomenon and analyse the governor characteristics.
21ME55.3	Determine stresses in disk, beams and plates using photo elastic bench and determination of Pressure distribution in Journal bearing
21ME55.4	Realize different mechanisms and cam motions

Course Name	Production and Operations Management
Course Code	21ME61
Course outcomes (COs): At the end of the course the student will be able to:	
21ME61.1	Understand various mathematical models for facility location and capacity planning, effectively solving these models to make informed decisions, drawing on their knowledge of mathematics, science, engineering, and management fundamentals.
21ME61.2	Demonstrate their strong background in mathematics, science, engineering, and management fundamentals by preparing aggregate plans and master schedules within organizations, ensuring efficient resource allocation and production planning.
21ME61.3	Apply decision-making tools, including break-even analysis, linear programming, statistical analysis, and simulation, by utilizing their knowledge of mathematics, science, and engineering fundamentals to solve real-world problems.
21ME61.4	Analyze forecasting models as mathematical equations and skilfully solve them, demonstrating their proficiency in mathematics, science, engineering, and management fundamentals

Course Name	Heat Transfer
Course Code	21ME62
Course outcomes (COs): At the end of the course the student will be able to:	
21ME62.1	Understand the basics of heat transfer analysis.
21ME62.2	Apply the knowledge of conduction, convection and radiation to real life problems
21ME62.3	Apply the knowledge of heat transfer to solve the problems on heat exchangers, boiling and condensation.
21ME62.4	Analyze a given heat transfer problem to find a thermal solution.

Course Name	Machine design
Course Code	21ME63
Course outcomes (COs): At the end of the course the student will be able to:	
21ME63.1	Explain the concept in management and apply the same in an organization.
21ME63.2	Compare the functional concepts and interest rates pertaining to personal loans, EMI payment and taxation.
21ME63.3	Apply the knowledge of engineering economics to evaluate the present, future annual worth and also rate of return of assets to select the best economic model.
21ME63.4	Apply the principles of costing and depreciation to estimate selling price and depreciation of commodities.

Course Name	CNC Programming and 3-D Printing Lab
Course Code	21ME66
Course outcomes (COs): At the end of the course the student will be able to:	
21ME66.1	Develop and execute the part programming for any given specific operation
21ME66.2	Demonstrate CAM tool path and prepare NC G-code
21ME66.3	Develop 3D model using available biomedical data
21ME66.4	Build any real life object using 3D printing process

Course Name	Mini Project
Course Code	21MEMP67
Course outcomes (COs): At the end of the course the student will be able to:	
21MEMP67.1	Define Specifications, Conceptualize, Design and implement a project
21MEMP67.2	Communicate the work carried out as a technical report and orally
21MEMP67.3	Work in a team and contribute to team work
21MEMP67.4	Indulge in self-learning and be motivated for life-long learning

Course Outcomes of Fourth -Year Courses

Course Name	Automation and Robotics
Course Code	21ME71
Course outcomes (COs): At the end of the course the student will be able to:	
21ME71.1	Understand the basic principles of Robotic technology, configurations, control and Programming of Robots.
21ME71.2	Explain the basic principles of programming and apply it for typical Pick & place, Loading & unloading and palletizing applications
21ME71.3	Translate and simulate a real time activity using modern tools and discuss the Benefits of automation.
21ME71.4	Identify suitable automation hardware for the given application.

Course Name	Control Engg
Course Code	21ME72
Course outcomes (COs): At the end of the course the student will be able to:	
21ME72.1	Identify the type of control and control actions and develop models
21ME72.2	Interpret the errors in different states of functioning and time response
21ME72.3	Estimate the gain in a system using block diagrams and signal flow graphs
21ME72.4	Analyze the complex physical system using time and frequency domain analysis

Course Name	Project work
Course Code	21ME76
Course outcomes (COs): At the end of the course the student will be able to:	
21ME76.1	Apply knowledge of mathematics, science and engineering to solve Mechanical engineering domain problems. .
21ME76.2	Design, develop, present and document innovative/multidisciplinary modules for a complete engineering system
21ME76.3	Utilize modern engineering tools, software and equipment to solve problem and engage in life-long learning to follow technological developments
21ME76.4	Execute comprehensive problem solving in Mechanical engineering, including problem identification, solution design and implementation

Course Name	Technical Seminar
Course Code	21ME81
Course outcomes (COs): At the end of the course the student will be able to:	
21ME81.1	Communicate effectively on complex engineering problems and demonstrate contextual knowledge to assess societal and environmental contexts. .
21ME81.2	Identify, formulate, review research literature, analyze and Design solutions for complex engineering problems using appropriate techniques with effective documentation.
21ME81.3	Analyze, interpret and synthesize the information to provide valid conclusions with innovative ideas and ethical principles.
21ME81.4	Apply the knowledge of engineering specialization to suggest solutions to complex engineering problems and recognize the need for technological changes.

2018 Scheme (UG)

Course Outcomes of Second -Year Courses

Course Name	Transform Calculus, Fourier Series & Numerical Techniques
Course Code	18MAT31
Course outcomes (COs): At the end of the course the student will be able to:	
18MAT31.1	Illustrate the concepts of– Laplace, Fourier & Z transformation, Fourier series, Numerical solutions of ODE and Calculus of variation.
18MAT31.2	Apply the above acquired knowledge to solve the problems in engineering.
18MAT31.3	Analyze the solutions of the real-world problems using above techniques.
18MAT31.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	Mechanics of materials
Course Code	18ME32
Course outcomes (COs): At the end of the course the student will be able to:	
18ME32.1	Understand simple, compound, thermal stresses, their relations, strain and deformations
18ME32.2	Apply the knowledge of stresses, strains and deformations for structural members
18ME32.3	Apply the knowledge of stresses and strains for components subjected to bending and shear loads
18ME32.4	Analyse the shafts subjected to twisting loads and compare different columns

Course Name	Basic thermodynamics
Course Code	18ME33
Course outcomes (COs): At the end of the course the student will be able to:	
18ME33.1	Understand the definitions and laws of thermodynamics as applicable to matters.
18ME33.2	Apply the knowledge of laws of thermodynamics to the pure substances and ideal /real gases.
18ME33.3	Apply the knowledge of thermodynamic laws for the energy transfer, entropy to solve numerical problems.
18ME33.4	Analyse the thermodynamic systems using thermodynamic laws for the solution of complex thermal problems.

Course Name	Material Science
Course Code	18ME34
Course outcomes (COs): At the end of the course the student will be able to:	
18ME34.1	Explain the mechanical behavior of different Engineering Materials.
18ME34.2	Identify different phases in the phase diagrams, TTT, CCT curves and classify different Heat treatment processes
18ME34.3	Identify different materials composition, properties and applications
18ME34.4	Recommend suitable engineering materials for suitable applications.

Course Name	Metal Cutting and Forming
Course Code	18ME35A/45A
Course outcomes (COs): At the end of the course the student will be able to:	
18ME35A/45A.1	Explain the construction & specification of various machine tools, forming tools and equipments used for manufacturing.
18ME35A/45A.2	Compare various metal cutting and metal forming processes and select appropriate processes for particular application.
18ME35A/45A.3	Apply mechanics of machining and forming to analyse and compare various manufacturing processes
18ME35A/45A.4	Evaluate economics involved in machining taking and forming in to consideration cutting tool material, cutting fluid and surface finish

Course Name	Metal Casting and Welding
Course Code	18ME35B/45B
Course outcomes (COs): At the end of the course the student will be able to:	
18ME35B/45B.1	Remember the fundamental concepts of metal casting and welding techniques.
18ME35B/45B.2	Explain the key principles behind metal casting and welding methods.
18ME35B/45B.3	Apply knowledge to select suitable materials and techniques for metalworking tasks.
18ME35B/45B.4	Analyze safety and quality factors related to metal casting and welding processes.

Course Name	Computer Aided Machine Drawing
Course Code	18ME36A/46A
Course outcomes (COs): At the end of the course the student will be able to:	
18ME36A/46A.1	Identify and understand national and international standards pertaining to machine drawing and visualization of part drawings
18ME36A/46A.2	Apply the limits and tolerances to assemblies and choose appropriate fits for given assembly
18ME36A/46A.3	Interpret the machining and surface finish symbols on the component drawing
18ME36A/46A.4	Preparation of the part or assembly drawings as per the conventions.

Course Name	Material Testing Lab
Course Code	18MEL37A/47A
Course outcomes (COs): At the end of the course the student will be able to:	
18MEL37A.1	Understand Calibration of pressure gauge, thermocouple, LVDT, load cell, micrometer
18MEL37A.2	Apply concepts of Measurement of angle using Sine Centre/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.
18MEL37A.3	Demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats, surface roughness.
18MEL37A.4	Analyze tool forces using Lathe/Drill tool dynamometer and Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth Vernier/Gear tooth micrometer

Course Name	Workshop and Machine Shop Practice
Course Code	18MEL38A/48A
Course outcomes (COs): At the end of the course the student will be able to:	
18MEL38A.1	Relate the basic operations of hand tools and machine tools.
18MEL38A.2	Select appropriate machining parameters and processes
18MEL38A.3	Choose appropriate tools for machining operations
18MEL38A.4	Adapt the principles of turning, milling, shaping and hand tools and develop mechanical components

Course Name	Complex Analysis, Probability and Statistical Methods
Course Code	**18MAT41**
Course outcomes (COs): At the end of the course the student will be able to:	
18MAT41.1	Illustrate the concepts of– complex functions, transformation, Probability distributions and Statistical methods.
18MAT41.2	Apply the above acquired knowledge to solve the problems in engineering.
18MAT41.3	Analyze the solutions of the real-world problems using above techniques.
18MAT41.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	Applied Thermodynamics
Course Code	**18ME42**
Course outcomes (COs): At the end of the course the student will be able to:	
18ME42.1	Explain thermodynamic cycles/ relations for thermal engineering applications to find work and efficiency/performance.
18ME42.2	Apply the laws of thermodynamics to determine the performance parameters of thermal engineering applications
18ME42.3	Solve thermal engineering problems using thermodynamic relations and charts
18ME42.4	Analyse modifications of basic thermodynamic cycles for optimizing work and Increasing efficiency/ performance of thermal engineering applications

Course Name	Fluid Mechanics
Course Code	**18ME43**
Course outcomes (COs): At the end of the course the student will be able to:	

18ME43.1	Understand and calculate the key fluid properties used in the analysis of fluid behaviour.
18ME43.2	Explain the principles buoyancy and apply the knowledge of fluid kinematics while addressing problems of mechanical engineering. Stability of floating objects.
18ME43.3	Understand and apply the principles of fluid dynamics.
18ME43.4	Understand the concept of boundary layer and apply the dimensional analysis methods to derive equations and analyze fluid flow systems.

Course Name	Kinematics of Machines
Course Code	18ME44
Course outcomes (COs): At the end of the course the student will be able to:	
18ME44.1	Understand mechanisms, their motions and inversions.
18ME44.2	Analyse velocity and acceleration of links and joints in mechanisms
18ME44.3	Apply cam-follower motion for required specifications
18ME44.4	Analyse the working of spur gears

Course Name	Mechanical Measurements and Metrology
Course Code	18ME36B/46B
Course outcomes (COs): At the end of the course the student will be able to:	
18ME36/46B.1	Understand the concepts of metrology and measurement
18ME36/46B.2	Analyse the concepts of gauge design and application
18ME36/46B.3	Understand the working and usage of measuring instruments
18ME36/46B.4	Apply the process of measurements in gears and screw threads

Course Name	Material Testing Lab
Course Code	18MEL37A/47A
Course outcomes (COs): At the end of the course the student will be able to:	
18MEL37/47A.1	Understand Calibration of pressure gauge, thermocouple, LVDT, load cell, micrometer.
18MEL37/47A.2	Apply concepts of Measurement of angle using Sine Centre/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.

18MEL37/47A.3	Demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats.
18MEL3747A.4	Analyse Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth Vernier/Gear tooth micrometer

Course Name	Foundry, Forging and Welding Lab
Course Code	18 MEL38B/48B
Course outcomes (COs): At the end of the course the student will be able to:	
18 MEL38/48B.1	Utilize various tools in the foundry, forging and welding process.
18 MEL38/48B.2	Demonstrate various skills in preparation of moulding
18 MEL38/48B.3	Conducting tensile, shear and compression test for moulding sand in sand testing machine
18 MEL38/48B.4	Create the forging models by using forging tools, which includes upsetting, drawing and bending operations

Course Outcomes of Third -Year Courses

Course Name	Management and Economics
Course Code	18ME51
Course outcomes (COs): At the end of the course the student will be able to:	
18ME51.1	Explain the concept in management and apply the same in an organization.
18ME51.2	Compare the functional concepts and interest rates pertaining to personal loans, EMI payment and taxation.
18ME51.3	Apply the knowledge of engineering economics to evaluate the present, future annual worth and also rate of return of assets to select the best economic model.
18ME51.4	Apply the principles of costing and depreciation to estimate selling price and depreciation of commodities.

Course Name	Design of Machine Elements I
Course Code	18ME52
Course outcomes (COs): At the end of the course the student will be able to:	
18ME52.1	Explain the concept in management and apply the same in an organization.
18ME52.2	Compare the functional concepts and interest rates pertaining to personal loans, EMI payment and taxation.
18ME52.3	Apply the knowledge of engineering economics to evaluate the present, future annual worth and also rate of return of assets to select the best economic model..
18ME52.4	Apply the principles of costing and depreciation to estimate selling price and depreciation of commodities.

Course Name	Dynamics of Machines
Course Code	18ME53
Course outcomes (COs): At the end of the course the student will be able to:	
18ME53.1	Explain the concept in management and apply the same in an organization.
18ME53.2	Compare the functional concepts and interest rates pertaining to personal loans, EMI payment and taxation.
18ME53.3	Apply the force-motion relationships in mechanisms for speed control and stability control.
18ME53.4	Use the knowledge on force-motion and stability to analyse the vibrating systems and compare different vibratory systems

Course Name	Turbo Machines
Course Code	18ME54
Course outcomes (COs): At the end of the course the student will be able to:	
18ME54.1	Understand basics of turbo machines, velocity triangles.
18ME54.2	Apply the knowledge of velocity triangles to the power absorbing and power producing turbomachines.
18ME54.3	Apply the knowledge of thermodynamics of fluid flow to the power producing and power absorbing turbomachines.
18ME54.4	Analyse a given turbomachine in order to assess its performance

Course Name	Fluid Power Engineering
Course Code	18ME55
Course outcomes (COs): At the end of the course the student will be able to:	
18ME55.1	Recall the properties of fluids, seals, pipes and hoses and relate the same for selection in hydraulic and pneumatic systems.
18ME55.2	Explain the working of different components used in hydraulic and pneumatic systems
18ME55.3	Construct hydraulic and pneumatic circuits for different applications by analysing the working of components.
18ME55.4	Analyse the working of hydraulic and pneumatic circuits and interpret for proper functioning

Course Name	Operations Management
Course Code	18ME56
Course outcomes (COs): At the end of the course the student will be able to:	
18ME56.1	Explain the concept and scope of operations management in a business context
18ME56.2	Recognize the role of Operations management among various business functions and its role in the organization's strategic planning and gaining competitive advantage
18ME56.3	Analyze the appropriateness and applicability of a range of operations management systems/models in decision making.
18ME56.4	Assess a range of strategies for improving the efficiency and effectiveness of organizational operations.

Course Name	Fluid Mechanics and Machines Lab
Course Code	18MEL57
Course outcomes (COs): At the end of the course the student will be able to:	
18MEL57.1	Find the coefficient of discharge of flow measuring devices
18MEL57.2	Experiment with hydraulic turbines and pumps to draw characteristics.
18MEL57.3	Analyse the knowledge in real life situations.
18MEL57.4	Discover the competency towards preventive maintenance of hydraulic machines.

Course Name	Energy Conversion Laboratory
Course Code	18MEL58
Course outcomes (COs): At the end of the course the student will be able to:	
18MEL58.1	Classify various types of fuels and oils determine its properties.
18MEL58.2	Conduct experiments on engines and draw characteristics
18MEL58.3	Analyze the performance parameters of I.C. Engine and implement the knowledge in industry.
18MEL58.4	Evaluate the exhaust emission, factors affecting them.

Course Name	Finite Element Methods
Course Code	18ME61
Course outcomes (COs): At the end of the course the student will be able to:	
18ME61.1	Classify various types of fuels and oils determine its properties.
18ME61.2	Conduct experiments on engines and draw characteristics
18ME61.3	Analyze the performance parameters of I.C. Engine and implement the knowledge in industry.
18ME61.4	Evaluate the exhaust emission, factors affecting them

Course Name	Design of Machine Elements II
Course Code	18ME62
Course outcomes (COs): At the end of the course the student will be able to:	
18ME62.1	Understand the fundamentals of design of machine elements and apply engineering design tools to product design.
18ME62.2	Determine major and minor losses in flow through pipes.
18ME62.3	Investigate performance characteristics of various fluid pumps.
18ME62.4	Determine flash point, fire point, calorific value, viscosity, cloud point, moisture content of fuel and lubricants

Course Name	Heat Transfer
Course Code	18ME63
Course outcomes (COs): At the end of the course the student will be able to:	
18ME63.1	Understand basics of turbo machines, velocity triangles.
18ME63.2	Apply the knowledge of velocity triangles to the power absorbing and power producing turbomachines.
18ME63.3	Apply the knowledge of thermodynamics of fluid flow to the power producing and power absorbing turbomachines.
18ME63.4	Analyse a given turbomachine in order to assess its performance.

Course Name	Computer Aided Modelling and Analysis Lab
Course Code	18MEL66
Course outcomes (COs): At the end of the course the student will be able to:	
18MEL66.1	Acquire basic understanding of Modeling and Analysis software
18MEL66.2	Understand the concepts of different kinds of loading on bars, trusses and beams, and analyze the results pertaining to various parameters like stresses and deformations
18MEL66.3	Apply the basic principles to carry out dynamic analysis to know the natural frequencies of different kind of beams.
18MEL66.4	Describe types of frames, brakes and tires used for two and three wheeled vehicles

Course Name	Heat Transfer Lab
Course Code	18MEL67
Course outcomes (COs): At the end of the course the student will be able to:	
18MEL67.1	Understand the behavior of thermal systems
18MEL67.2	Conduct the experimental analysis, including the application and heat transfer through solids, fluids, and vacuum.
18MEL67.3	Conduct the General procedure, advantages and limitations of the processes
18MEL67.4	Investigate the Convection, conduction, and radiation heat transfer in one and two dimensional steady and unsteady systems are examined.

Course Outcomes of Fourth -Year Courses

Course Name	Control Engineering
Course Code	18ME71
Course outcomes (COs): At the end of the course the student will be able to:	
18ME71.1	Identify the type of control and control actions and develop models
18ME71.2	Interpret the errors in different states of functioning and time response
18ME71 .3	Estimate the gain in a system using block diagrams and signal flow graphs
18ME71.4	Analyse the complex physical system using time and frequency domain analysis

Course Name	Computer Aided Design and Manufacturing
Course Code	18ME72
Course outcomes (COs): At the end of the course the student will be able to:	
18ME72.1	Impart knowledge of CIM and Automation and different concepts of automation by developing mathematical models.
18ME72.2	Understand the Computer Applications in Design and Manufacturing [CAD / CAM] leading to Computer integrated systems. Enable them to perform various transformations of entities on display devices.
18ME72.3	Expose students to computer aided process planning, material requirement planning, capacity planning etc
18ME72.4	Apply the concepts of Additive Manufacturing, Internet of Things, and Industry 4.0 leading to Smart Factory.

Course Name	Design Lab
Course Code	18MEL77
Course outcomes (COs): At the end of the course the student will be able to:	
18MEL77.1	Apply the fundamentals of Mechanical Vibrations to find natural frequency, damping ratio of mechanical systems.
18MEL77.2	Evaluate the Gyroscopic effect, centrifugal forces in Governors and balancing of rotating masses.
18MEL77.3	Analyze the fundamental concepts of stresses in curved beams, photo elastic members and 2D stresses on cylinder surface due to internal pressure and pressure distribution in journal bearing

18MEL77.4	Collating case studies from employees in housekeeping and labs (workshops, electrical, machine shops, electronics, and computer), while assessing and mitigating chemical and electrical hazards

Course Name	Project Work Phase-I
Course Code	18MEP78

Course outcomes (COs): At the end of the course the student will be able to:

18MEP78.1	Apply Mechanical engineering principles to address practical challenges in industry contribute to research advancements.
18MEP78.2	Plan, assess, and design mechanical engineering projects effectively wh communicating ideas clearly in both speech and writing.
18MEP78.3	Master Mechanical engineering concepts for leading medium-sized industry projects proposing innovative research approaches.
18MEP78.4	Execute comprehensive problem solving in marine engineering, including proble identification, solution design and implementation

Course Name	Energy Engineering
Course Code	18ME81

Course outcomes (COs): At the end of the course the student will be able to:

18ME81.1	Understand the basic concepts of thermal energy systems
18ME81.2	Identify renewable energy sources and their utilization.
18ME81.3	Analyze the fundamental concepts of stresses in curved beams, photo elastic membe and 2D stresses on cylinder surface due to internal pressure and pressure distribution journal bearing
18ME81.4	Collating case studies from employees in housekeeping and labs (workshops, electric machine shops, electronics, and computer), while assessing and mitigating chemical a electrical hazards

Course Name	Technical Seminar
Course Code	18MES84

Course outcomes (COs): At the end of the course the student will be able to:

18MES84.1	Attain, use and develop knowledge in the field of engineering and other disciplines through independent learning and collaborative study.
18MES84.2	Identify, understand and discuss current, real-time issues along with the improvement of oral and written communication
18MES84.3	Explore an appreciation of the self in relation to its larger diverse social and academic contexts.

18MES84.4	Apply principles of ethics and respect in interaction with others.

Course Name	Project Work Phase - II
Course Code	18MEP83

Course outcomes (COs): At the end of the course the student will be able to:

18MEP83.1	Apply Mechanical engineering principles to address practical challenges in industry or contribute to research advancements.
18MEP83.2	Plan, assess and design Mechanical engineering projects effectively, while communicating ideas clearly in both speech and writing.
18MEP83.3	Master in Mechanical engineering concepts for leading medium sized projects in industry or proposing innovative research approaches.
18MEP83.4	Execute comprehensive problem solving in Mechanical engineering, including problem identification, solution design and implementation