3rd Semester   **ME 14301 Strength of Materials-I**

Internal Marks: 40	**L**	**T**	**P**	**C**
External Marks: 60	**3**	**1**	**-**	**4**

Total Marks: 100

Course Outcomes:

After studying this course, students shall be able to:

1. Apply the concept of stresses, strains and their relationships to determine the principal stresses.
2. Construct and analyze the shear force and bending moment diagram under different loading conditions.
3. Calculate the bending stresses in different type of beams.
4. Design simple bars and shafts for allowable shearing stresses and loads.
5. Analyse the stresses in slender and long columns subjected to axial loads.
6. Evaluate slope and deflection in different type of beams under different loading conditions.

3rd Semester   **ME 14302 Theory of Machines-I**

Internal Marks: 40	**L**	**T**	**P**	**C**
External Marks: 60	**3**	**1**	**-**	**4**

Total Marks: 100

Course Outcomes:

After studying this course, students shall be able to:

1. Understanding the basic concept of kinematics and kinetics of machine elements.
2. Analyse the mechanism by velocity and acceleration diagrams.
3. Understanding the various lower and high pairs.
4. Calculate loss of power due to friction in various machine elements.
5. Applying the concepts of flywheel and governor to control the speed of engine.
6. Creating and designing of different types of cams.

3rd Semester   **ME-14303 Machine Drawing**

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**2**	**-**	**4**

Total Marks: 100

Course Outcomes:

After studying this course, students shall be able to:

1. Read, draw and interpret the machine drawings and related parameters.
2. Understand and monitor the manufacturing of components at shop floor level as per the information in the given drawing.
3. Apply and analysis the proper use of various types of screw threads, nuts and bolts, locking device etc.
4. Understand the concept of limits, fits and tolerances in various mating parts.
5. Draw free hand sketches of various machine components.
6. Visualize and create/generate different views of a component with detailed internal information in the assembly.

3rd Semester   **ME 14304 Applied Thermodynamics-I**

Internal Marks: 40	**L**	**T**	**P**	**C**
External Marks: 60	**3**	**1**	**-**	**4**

Total Marks: 100

Course Outcomes :

After studying this course, students shall be able to:

1. Analyse the products of combustion in boilers and I.C. engines.

2. Use the steam table and Mollier chart to evaluate properties of steam.
3. Analyse various vapour power cycles and suggest appropriate cycle for practical applications.
4. Design the steam nozzles from point of view of thermal and fluid considerations.
5. Evaluate the Performance of impulse and reaction turbines and determine the blade parameters.
6. Understand the various methods for the improvement of performance of turbines and steam condensers.

3rd Semester   ME 14305 Manufacturing Processes –I
Internal Marks: 40   **L   T   P   C**
External Marks: 60   **4   -   -   4**
Total Marks: 100
Course Outcomes:

After studying this course, students shall be able to:
1. Use the Knowledge of Fundamental principles of Castings and Welding processes for their practical applications.
2. Identify and suggest equipments, tools and accessories required for performing the casting and welding processes.
3. Design the riser and gating system for casing processes.
4. Test the products made by casting and welding processes using destructive and non-destructive means so as to appreciate their utility.
5. Design the weld joints and select suitable welding electrodes and consumables for various   welding processes.
6. Understand the latest technologies in Casting and Welding Processes.

3rd Semester   ME 14306 Engineering Materials & Metallurgy
Internal Marks: 40   **L   T   P   C**
External Marks: 60   **4   -   -   4**
Total Marks: 100
Course Outcomes:

Course Outcomes
After studying this course, students shall be able to:
1. Understand the significance of the metallurgical characteristics of engineering materials (both ferrous and nonferrous).
2. Explain the theories of diffusion, plastic deformation and re-crystallization.
3. Analyze various heat treatment processes and their applications for different materials.
4. Explain the role of Fe-C and TTT diagram for controlling the desired structure and properties of the materials.
5. Suggest the methods to determine the hardiness of materials.
6. Understand the significance of ferrous and non ferrous metals and their alloys

3rd Semester   ME 14307 Manufacturing Processes & Metallurgy Lab
Internal Marks: 30   **L   T   P   C**
External Marks: 20   **-   -   2   1**
Total Marks: 50
Course Outcomes:

After studying this course, students shall be able to:
1. Remember the major characteristics of moulding sand.
2. Analyse the properties of moulding sand by performing various tests.
3. Understand the basis of welding processes like MIG, TIG & SEAM Welding.
4. Evaluate the effect of welding parameters on welding of mild steel sheets.
5. Apply various techniques of heat treatment to understand their effect on properties of steel.
6. Create/Prepare specimens of mild steel for study of microstructure.

3rd Semester   ME 14308 Strength of Materials Lab

		L	T	P	C
Internal Marks: 30					
External Marks: 20		-	-	2	1
Total Marks: 50					

Course Outcomes:
After studying this course, students shall be able to:
1. Conduct mechanical testing (Tensile, compression, Impact, bending, torsion of various materials).
2. Compare mechanical properties of various materials.
3. Determine buckling load of long columns.
4. Understand load –deflection relation of helical spring.
5. Conduct fatigue testing of the materials.
6. Conduct hardness test on various materials.

3rd Semester   ME 14309 Applied Thermodynamics Lab

		L	T	P	C
Internal Marks: 30					
External Marks: 20		-	-	2	1
Total Marks: 50					

Course Outcomes:
After studying this course, students shall be able to:
1. Identify different types of IC engines and their parts; understand construction & working of IC engines.
2. Understand impact of valve timing on performance of IC engines.
3. Demonstrate the construction and working of different types of steam generators and their parts.
4. Evaluate the performance of steam generators.
5. Evaluate the performance of IC engines.
6. Demonstrate the construction and working of power plant parts like condensers.

4th Semester   **ME 14401 Strength of Materials – II**

Internal Marks: 40   **L   T   P   C**
External Marks: 60   **3   1   - 4**
Total Marks: 100

Course Outcomes:
After studying this course, students shall be able to:
1. Analyze strain energy in bean under different kinds of loads
2. Perform design analysis of pressure vessels and springs.
3. Use Application of failure theory for safe design of mechanical components.
4. Analyze and design beam under shearing stresses.
5. Analyze rotational stresses in various sections of machine component.
6. Design various cross-sectional curved beams for different applications.

4th Semester   **ME 14402 Theory of Machines – II**

Internal Marks: 40   **L   T   P   C**
External Marks: 60   **3   1   -   4**
Total Marks: 100

Course Outcomes:
After studying this course, students shall be able to:
1. Evaluate inertia forces and couples applied to the reciprocating parts of machines.
2. Applying the concept of Static and dynamic balancing of rotating and reciprocating masses.
3. Understand the function and application of gears.
4. Evaluate the velocity ratio and torque in different gear trains.
5. Analyze gyroscopic couple and effect in two and four wheelers.
6. Identifies the motion characteristics of different mechanisms.

4th Semester   **ME 14403 Fluid Mechanics**

Internal Marks: 40   **L   T   P   C**
External Marks: 60   **3   1   -   4**
Total Marks: 100

Course Outcomes:
After studying this course, students shall be able to:
1. Understand the concept of fluids and various fluid properties.
2. Analyse problems related to fluid in rest/ relative equilibrium conditions.
3. Comprehend the fluid flow classifications, flow parameters and flow visualization.
4. Evaluate fluid dynamics problems on the basis of momentum and energy concepts.
5. Apply dimensional analysis and similitude techniques to various physical fluid phenomena.
6. Design pipe networks for different flow situations by considering different head losses.

4th Semester   **ME 14404 Applied Thermodynamics-II**

Internal Marks: 40   **L   T   P   C**
External Marks: 60   **3   1   -   4**
Total Marks: 100

Course Outcomes:
After studying this course, students shall be able to:
1. Use and apply the analysis of positive and dynamic compressors.
2. Analyze the single and multi-stage reciprocating air compressor cycles.
3. Recognition, construction and working of rotary air compressor.
4. Performance evaluation at various applications of centrifugal compressors axial flow

compressors.
5. Analyze the gas turbine system for various applications.
6. Identify the description of various propulsion systems.

4th Semester **ME 14405 Manufacturing Processes-II**
Internal Marks: 40 **L T P C**
External Marks: 60 **4- - 4**
Total Marks: 100
Course Outcomes:
After studying this course, students shall be able to:
1. Understand the fundamental principles of metal forming, Metal Cutting, and Powder Metallurgy and recognize related machine tools and parameters of the processes for analyzing the effect of process parameters on performance.
2. Select metal machining and metal forming processes needed for the manufacturing of various geometrical shapes of products.
3. Acquire knowledge of geometry of cutting tools and develop relationship of cutting forces in metal cutting.
4. Understand cutting tool materials and related concepts like tool life, wear, and coolants/lubricants.
5. Use machine tools for various machining operations in conventional manufacturing
6. Calculate cutting speed, feed depth of cut for various machining processes.

4th Semester **ME 14406 Fluid Mechanics Lab**
Internal Marks: 30 **L T P C**
External Marks: 20 **- - 2 1**
Total Marks: 50
Course Outcomes:
After studying this course, students shall be able to:
1. Validate/justify Bernoulli's equation in duct flow. .
2. Distinguish various type of flows and flow measurement techniques.
3. Determine discharge, pressure, velocity, hydraulic coefficients for different types of flow situations.
4. Determine the different types of head losses in pipe networks with friction coefficient values.
5. Understand metacentre concept of a floating vessel and concept of stability.
6. Understand flow patterns and various flow visualization techniques.

4th Semester **ME 14407 Manufacturing Process Lab**
Internal Marks: 30 **L T P C**
External Marks: 20 **- - 2 1**
Total Marks: 50
After studying this course, students shall be able to:
1. Conduct various tests to determine major characteristics of molding sand.
2. Understand the constructional details and working of major equipment used in metal forming and press tools.
3. Grind single and multipoint cutting tools.
4. Perform various operations on Centre lathe, shaper and milling machine.
5. Understand the importance of various angles on single and multi point cutting tools.
6. Apply the fundamentals of metal cutting for determining cutting forces with the use of tool dynamometer.

4th Semester   **ME 14408 Theory of Machines Lab**

Internal Marks: 30   **L   T   P   C**

External Marks: 20   **-   -   2   1**

Total Marks: 50

Course Outcomes:

After studying this course, students shall be able to:

1. Conceptualize the function and applications of kinematic chains, mechanisms.
2. Calculate coefficient of friction for different types of belt-pulleys and material combinations.
3. Understand the function of gears and evaluate gear train value of different gear trains.
4. Determine magnitude and position of balancing mass for unbalanced rotating parts.
5. Create the profile of cam with various followers and pressure distribution profile of journal bearings.
6. Compare the function of governors and flywheels to control the engine speed.

5th Semester   **ME -14500 Mathematics-III**

Internal Marks: 40   **L T P C**

External Marks: 60   **3 1 - 4**

Total Marks: 100

Course Outcomes

After studying this course, students shall be able to:

1. Decompose periodic functions or periodic signals into the sum of a (possibly infinite) set of simple oscillating functions namely sines and cosines (or complex exponentials).
2. Apply De-Moivre's theorem to basic functions of complex variables
3. Use power series method to solve differential equation and its application to Bessel's and Legendre's equations.
4. Analyze Partial differential equations and learn simplest means to solve them.
5. Apply method of separation of variables to solve wave and heat equation.
6. Understand the concepts of limit, continuity and derivative of complex variables and use analytic functions which are widely applicable to two dimensional problems in engineering.

5th Semester   **ME - 14501 Design of Machine Elements-I**

Internal Marks: 40   **L T P C**

External Marks: 60   **4 - - 4**

Total Marks: 100

Course Outcomes

After studying this course, students shall be able to:
1. Remember the meaning of machine design and types of design processes.
2. Understand various design considerations like stress concentration factor and factor of safety.
3. Design of various basic machine components under different loading conditions.
4. Analyse the fastening processes like welding, riveting etc. For different applications.
5. Evaluate machine members like levers,shafts,axles,keys, coupling and cotters etc. As per different requirements in the industry.
6. create the design and suggest/apply suitable modifications in the design

5thSemester   **ME-14502 Computer Aided Design and Manufacturing**

Internal Marks: 40   **L T P C**

External Marks: 60   **4 - - 4**

Total Marks: 100

Course Outcomes

After studying this course, students shall be able to:
1. Describe the role of computer systems in design and manufacturing.
2. Understand and create geometric models by using various techniques of geometric modeling.
3. Apply geometric transformations on different model entities.
4. Describe the key concept of NC / CNC / DNC.
5. Create and validate NC part program data using manual data input (MDI).
6. Evaluate integration of CAD/CAM and business aspects in an industry

5ᵗʰSemester   ME-14503 Mechanical Measurements and Metrology

Internal Marks: 40   **L   T   P   C**
External Marks: 60   **4   -   -   4**
Total Marks: 100
Course Outcomes

After studying this course, students shall be able to:

1. Understand the different types of mechanical measurements and measuring standards used for industrial applications
2. Derive relationship for static/dynamic characteristics and their response on measurement systems.
3. Analyze errors in measurements by statistical methods
4. Measure various elements of thread and gears.
5. Analyze the functions of various sensors and transducers for measurements of pressure, temperature and flow.
6. Identify various instruments used for measurement of speed, torque and force.

5ᵗʰSemester   ME-14504 Industrial Automation and Robotics

Internal Marks: 40   **L   T   P   C**
External Marks: 60   **4   - - 4**
Total Marks: 100
Course Outcomes

After studying this course, students shall be able to:

1. Understand the concept, need and application of hard automation, soft automation and their advantages.
2. Use the hydraulic/pneumatic valves and cylinders for their application in automation.
3. Design the pneumatic and hydraulic circuits for industrial automation applications.
4. Analyze the working of fluidic sensors for their industrial applications.
5. Understand the working of various transfer devices and feeders in manufacturing industry.
6. Programme the robotic arm for its industrial applications.

5ᵗʰSemester   ME-14505 Computer Aided Design and Manufacturing Lab.

Internal Marks: 30   **L   T   P   C**
External Marks: 20   **-   -   2   1**
Total Marks: 50
Course Outcomes

After undergoing this course, students shall be able to:

1. Understand and execute various features to create different parts.
2. Assemble and draft mechanical part using simple and advanced features.
3. Generate different views and provide relative movement between components.
4. Write manual part programme (G-Code) for CNC turning and milling using manual data input (MDI)
5. Execute machining of simple profiles on CNC turning and milling trainer.
6. Create and validate NC part program data) automatically using standard commercial CAM package for manufacturing of required component.

5ᵗʰ Semester   ME-14506 Mechanical Measurements and Metrology Lab

Internal Marks: 30   **L   T   P   C**
External Marks: 20   **-   -   2   1**
Total Marks: 50
Course Outcomes

After undergoing this course, students shall be able to:
1. Understand the basics of measurements and their needs in industry.
2. Measure dimensions; angles and shaft speed.
3. Measure the surface roughness of any metallic flat surface; pipe and rod.
4. Calibrate the pressure gauge and prepare a thermocouple and its calibration.
5. Measure threads elements and gear elements.
6. Plot the velocity profile by using Pitot tube.

5th Semester   ME-14507 Industrial Automation and Robotics Lab

		L	T	P	C
Internal Marks: 30					
External Marks: 20		-	-	2	1
Total Marks: 50					

Course Outcomes

After undergoing this course, students shall be able to:
1. Understand the working of hydraulic and pneumatic valves and their symbols
2. Design the basic hydraulic and pneumatic circuits using different types of valves.
3. Demonstration of the working of reciprocating movement of single acting and double acting cylinder
4. Design pneumatic/hydraulic clamping device for Jigs and fixture.
5. Understand the working of power steering mechanism
6. Understand the working of Robotic arm and end effectors.

6thSemester   **ME-14601 Design of Machine Elements -II**

Internal Marks: 40   **L   T   Pr   C**
External Marks: 60   **4   - -4**
Total Marks   : 100

Course Outcomes

After studying this course, students shall be able to:

1. Remember the various drives to transmit power for short distances, moderate distances and long distances.
2. Understand the design and selection of bearings for different industrial applications.
3. Apply the suitable lubricants (thin film lubricants, partial film lubricants and thick film lubricants etc.) as per the need of the mechanical system.
4. Analyse the design of various machine members like: springs, flywheel for different applications.
5. Evaluate machine members like clutches and brakes etc. as per different requirements in the industry.
6. Create the design and suggest/apply suitable modifications in the design.

6thSemester   **ME-14602 Heat Transfer**

Internal Marks: 40   **L   T   P   C**
External Marks: 60   **3   1   -   4**
Total Marks: 100

Course Outcomes

After studying this course, students shall be able to:

1. Recognize the predominant mode of heat transfer in various engineering applications.
2. Analyze the various heat transfer problems (mainly one dimensional under steady state condition) using basic laws of heat transfer and electrical analogy.
3. Develop mathematical relations to solve heat transfer problems.
4. Select and design the fins for various engineering applications.
5. Apply the basic laws of radiation and electrical network analysis to solve radiative heat exchange problems.
6. Design the heat exchangers by using the concept of conductive and convective (simple and phase change) heat transfer phenomenon.

6thSemester   **ME-14603 Hydraulic Machines**

Internal Marks: 40   **L   T   P   C**
External Marks: 60   **3   1   -   4**
Total Marks: 100

Course Outcomes

After studying this course, students shall be able to:

1. Recognize basic components of turbo machines and understand related fundamental laws/ principles and apply these for calculation of parameters like work done and efficiency.
2. Comprehend and evaluate constructional details, working and design aspects of runner/wheel of various water turbines.
3. Comprehend and evaluate constructional details, working and design aspects of Positive Displacement and Centrifugal pumps.
4. Analyse the Performance characteristics of Hydraulic Machines on the basis similitude analysis.
5. Understand various operating problems related with Hydraulic Turbines and Pumps and suggest respective preventive measures.
6. Demonstrate knowledge about various hydraulic devices like fluid coupling, accumulator and intensifier, etc.

6th Semester   **ME-14604 Heat Transfer Lab**

Internal Marks: 30   **L   T   P   C**
External Marks: 20   **-   -   2   1**
Total Marks: 50
Course Outcomes
After undergoing this course, students shall be able to:
1. Design and fabricate the experimental setups related to heat transfer phenomena.
2. Measure and analyse different heat transfer parameters.
3. Apply finite difference methods to solve simple heat transfer problems.
4. Perform experimentation on fabricated Experimental Set-up.
5. Assess relevance of prominent heat transfer mode in given circumstances.
6. Simulate various Heat Transfer situations by experimental techniques.

6thSemester   **ME-14605 Hydraulic Machines Lab**

Internal Marks: 30   **L   T   P   C**
External Marks: 20   **- -   2   1**
Total Marks: 50
Course Outcomes
After undergoing this course; students shall be able to:
1. Conduct experiments on scaled down models/ actual size hydraulic machines and evaluate results in terms of unit or specific quantities for comparison purpose.
2. Suggest different hydraulic machines for different conditions in order to have maximum efficiency.
3. Utilize various combinations of hydraulic systems to enhance overall efficiency of the system.
4. Suggest installations of hydraulic machines depending on different requirements.
5. Understand working of various pumps and can suggest remedial solutions for different faults.
6. Determine performance of centrifugal and reciprocating pumps.

6thSemester   **ME-14607 Design of Machine Elements –II Practice**
Internal Marks: 30   **L   T   P   C**
External Marks: 20   **-   -   2   1**
Total Marks: 50
After undergoing this course; students shall be able to:
1. Understand the belt and pulley assembly mechanism and do the complete design calculations, then justify the existing design.
2. Design a transmission system involving the chain drives / gear drives by specifying inputs parameters and then justify the design.
3. Design flywheel for industrial applications and suggest its suitability.
4. Design completely a hydrodynamic journal bearing and specify its suitability by using heat balance equation.
5. Design springs for automobile application by specifying conditions and constraints. An application of spring can be taken and some input parameters can be assumed.
6. Design a clutch/ brakes of an automobile and justify its suitability.

7ᵗʰ/8ᵗʰ Semester   ME 14801 Refrigeration and Air Conditioning

internal marks: 40   **L T P C**
External Marks: 60   **3 1 - 4**
Total Marks: 100
Course Outcomes

After studying this course, students shall be able to:

1. Understand and identify method/type of refrigeration and air conditioning systems.
2. Analyze and evaluate air refrigeration cycles and systems especially for aircraft air conditioning.
3. Analyze and evaluate vapour compression refrigeration cycle and system.
4. Identify the different refrigerants from their nomenclature and select them from environmental aspects and field of application.
5. Understand and determine psychrometric properties, evaluate various psychometric processes and calculate cooling and heating loads for different domestic, commercial and industrial conditions.
6. Design air conditioning and refrigeration systems for various applications and select their components.

7ᵗʰ/8ᵗʰ Semester   ME 14802 Mechanical Vibrations

Internal Marks: 40   **L T P C**
External Marks: 60   **3 1 - 4**
Total Marks: 100
Course Outcomes:

After studying this course student will be able to:

1. Formulate mathematical models of problems in vibrations using Newton's second law or energy principles.
2. Understand the need and measurement of vibration in mechanical systems.
3. Calculate principal modes of vibrations.
4. Explore the suitable methods of vibration reduction and absorption.
5. Ability to determine vibratory responses of SDOF, MDOF and continuous systems
6. Create the mathematical model of a vibratory system to determine its response.

7ᵗʰ/8ᵗʰ Semester   ME 14803 Automobile Engineering

Internal Marks: 40   **L T P C**
External Marks: 60   **4 - - 4**
Total Marks: 100
Course Outcomes

After studying this course, students shall be able to:

1. Identify the different parts of the automobile and to know the terminology related to automobiles.
2. Understand various types of frames, chassis, power units, suspension systems and wheel tyre constructional details and their applications
3. Analyse the environmental implications of automobile emissions and their mitigation
4. Understand the working and application of fuel supply system and various characteristics of fuels.
5. Understand the working of various lubrication and cooling systems and rating/characteristics of lubricants and coolants
6. Understand the automated/manual transmissions, steering system with geometry, braking system, electronic and electric systems with complete vehicle maintenance.

7th/8th Semester   ME 14804 Refrigeration and Air Conditioning Lab

		L	T	P	C
Internal Marks: 30

External Marks: 20   L   T   P   C

- - 2 1

Total Marks: 50

Course Outcomes

After studying this course, students shall be able to:

1. Understand and evaluate the performance of different types of refrigeration systems.
2. Estimate cooling and heating load of desired space for different refrigeration and air conditioning applications.
3. Understand the working of various commercial and industrial RAC systems.
4. Evaluate the performance of an air conditioning system.
5. Understand the importance of Psychrometric properties of moist air for an air conditioning system.
6. Recognize and select the different parts/components required for RAC systems.

7th/8th Semester   ME 14805 Mechanical Vibration Lab

Internal Marks: 30   L   T   P   C

External Marks: 20   -   -   2   1

Total Marks: 50

Course Outcomes

After performing the experiments student will be able to:

1. Determine the viscosity of fluid.
2. Determine radius of gyration of compound pendulum.
3. Determine natural frequency of simple structure.
4. Determine modulus of elasticity of given sample wire.
5. Demonstrate forced vibration.
6. Determine coefficient of dry friction.

7th/8th Semester   ME 14807 Automobile Engineering Lab

Internal Marks: 30   L   T   P   C

External Marks: 20   -   -   2   1

Total Marks: 50

Course Outcomes:

1. Understand the working of various automobile systems.
2. Identify the importance and features of different automobile components *viz.* axle, differential, brakes, steering, suspension etc.
3. Reface and grind the valves and check the leakages in valves.
4. Understand the fundamental knowledge of systems used to transfer and control energy from engine to the wheels which includes transmission system with gear box assembly, differential, clutches and brakes.
5. Understand the important parameters of ignition system and cooling system.
6. Understand and demonstrate different geometries involved in steering systems.

DEPARTMENT ELECTIVES
I.   SPECIALIZATION GROUP

DEME 14104   Energy Conservation and Management
DEME 14105   Fluid Mechanics-II
DEME 14108   Power Plant Engg.

DEME-14104 Energy Conservation and Management

Internal Marks: 40   **L T P C**
External Marks: 60   **4 - - 4**
Total Marks: 100

Course Outcomes

After studying this course, students shall be able to:
1. Apply the basic knowledge of different engineering concepts and principles for energy conservation and management of system.
2. Evaluate the energy saving & conservation in different electrical and thermal utilities.
3. Understand efficient steam, thermal & electric power utilization, saving and energy recovery in these systems.
4. Prepare energy audit report for different energy conservation instances.
5. Understand Importance and role of Energy Manager/ Energy Auditor
6. Comprehend current global energy scenarios, various energy protocols and energy crisis.

DEME-14105 Fluid Mechanics -II

Internal Marks: 40   **L T P C**
External Marks: 60   **4 - - 4**
Total Marks: 100

Course Outcomes

After studying this course, students shall be able to:
1. Evaluate the fluid flow problems which can be modeled as potential flow.
2. Apply viscous flow theory to various Laminar flow applications.
3. Know characteristics of Turbulent flow and need of Turbulence modeling.
4. Understand Boundary Layer features and can derive quantitative correlations for various Boundary Layer parameters.
5. Evaluate the coefficient of lift and drag for different shaped immersed bodies.
6. Understand the basics of compressible flow and static/ stagnation properties.

DEME-14108 Power Plant Engineering

Internal Marks: 40   **L T P C**
External Marks: 60   **4 - - 4**
Total Marks: 100

Course Outcomes
Course Outcomes (CO)

After studying this course, students shall be able to:
1. Understand energy sources for power generation and principles types of power plants.
2. Understand about essential features and types of hydro-electric and nuclear power plant.
3. Understand about essential features of steam power plant and also have knowledge about coal and ash handling systems.
4. Understand the working of I.C engines and able to compare its performance with other plants.
5. Conceptualize understanding of load factor, capacity factor, average load and peak load on power plant.
6. Understand different direct energy conversion systems.

(2)   MANUFACTURING

DEME 14201   Non-Traditional Machining
DEME 14202   Modern Welding and Forming Processes
DEME 14203   Computer integrated Manufacturing
DEME 14204   Computer Aided Process planning
DEME 14205   Machining Science
DEME 14206   Rapid Prototyping
DEME 14207   Modern Casting Processes
DEME 14208   Micromachining Technologies
DEME 14209   Manufacturing Systems

DEME 14201   Non-Traditional Machining

Internal Marks: 40   **L   T   P   C**
External Marks: 60
TOTAL MARKS: 100   **4   -   -   4**
Course Outcomes:

After studying this course, students shall be able to:

1. Understand the concept of latest technologies and need of Non-Traditional Machining processes in manufacturing.
2. Understand the principle, mechanism of metal removal of various non-conventional machining processes.
3. Analyze the various process parameters and their effect on the component machined on various unconventional machining processes.
4. Evaluate advantages, applications and limitations of the various non-traditional machining processes under different working conditions.
5. Understand the applications of different processes.
6. Select suitable process for stringent requirement of manufacturing industry.

DEME-14203 Computer Integrated Manufacturing

Internal Marks: 40   **L   T   P   C**
External Marks: 60
TOTAL MARKS: 100   **4   -   -   4**
Course Outcomes:

After studying this course, students shall be able to:

1. Understand the computer role in manufacturing.
2. Develop part programming for machining operations.
3. Describe scope of group technology in fabrication industry.
4. Prepare CAPP (Computer Aided Process Planning) for fabrication process equipment.
5. Design considerations for FMS.
6. Analyze problems of PPC, MRP-I, MRP-II.

DEME-14204 Computer Aided Process Planning

Internal Marks: 40   **L   T   P   C**
External Marks: 60   **4   0   0   4**
Total Marks: 100
Course Outcomes

After studying this course, students shall be able to:

1. Understand the role of process planning in actual manufacturing.
2. Analyze and select the manufacturing processes and parameters to enable process plan development.
3. Remember the fundamentals of tolerances and coding systems in the process planning.
4. Create different production concepts to improve the manufacturability of the product.
5. Evaluate different approaches for process plan development.
6. Apply integrated process planning in improvement of traditional planning systems.

7th/8th Semester　　　　　　　**DEME 14205 Machining Science**

Internal Marks: 40	**L**	**T**	**P**	**C**
External Marks: 60	**4**	**0**	**0**	**4**

Total Marks: 100

Course Outcomes

After studying this course the students will be able to:

1. Elaborate the conceptual significance of conventional material removal in manufacturing.
2. Apply basic principles of science to correlate the input parameters of conventional machining processes with output parameters like cutting forces, power, tool life etc.
3. Solve problems and derive theoretical relations related to mechanics of metal machining
4. Develop procedure for experimental determination of cutting force, temperature and tool life by using suitable equipment.
5. Analyze and optimize machining processes.
6. Suggest remedial measure to reduce the ecological impact of machining processes.

7th/8th Semester　　　　　　　**DEME 14206 Rapid Prototyping**

Internal Marks: 40	**L**	**T**	**P**	**C**
External Marks: 60	**4**	**0**	**0**	**4**

Total Marks: 100

Course Outcomes

After studying this course the students will be able to:

1. Understand and use techniques for processing of CAD models for rapid prototyping.
2. Understand and apply fundamentals of rapid prototyping techniques.
3. Use appropriate tooling for rapid prototyping process.
4. Use rapid prototyping techniques for reverse engineering.
5. Design a CAD model.
6. Evaluate errors in RP processes.

(3)　DESIGN

DEME 14301	Design for X
DEME 14302	Product Design and Development
DEME 14303	Machine Tool Design
DEME 14304	Tool Design
DEME 14305	Experimental Stress Analysis
DEME 14306	Industrial Tribology
DEME 14307	Theory of Plasticity
DEME 14308	Mechatronics
DEME 14309	Finite Element Method

DEME - 14302 Product Design and Development

Internal Marks: 40	L	T	P	C
External Marks: 60	4	0	0	4

Total Marks: 100

Course Outcomes:

After studying this course, students shall be able to:

1. Understand the morphology of design.
2. Design the product graphics.
3. Compare the product design for Impact, Stiffness and Rigidity.
4. Analyse the economics of the product.
5. Design the product for ease of manufacturing and assembling.
6. Apply value engineering and modern approaches to minimize the cost of the product.

DEME-14306 Industrial Tribology

Internal Marks: 40	L	T	P	C
External Marks: 60	4	-	-	4

Total Marks: 100

Course Outcomes:

After completion of this course, student shall be able to

1. Understand the surface and sub surface constituent layers in engineering materials.
2. Analyse various methods for quality checking of engineering applicable surfaces.
3. Understand the theories and rigs accounting friction and Wear.
4. Analyse the variation of friction and wear in metals and non metals.
5. Select various lubrication systems and bearing for different working conditions.
6. Identify and analyze causes of failure of tribological components.

DEME-14309 Finite Element Method

Internal Marks: 40	L	T	P	C
External Marks: 60	4	0	0	4

Total Marks: 100

Course Outcomes

After studying this course, students shall be able to:

1. Understand the procedure involved to solve a problem using Finite Element Methods.
2. Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements, and 3-D element.
3. Develop the element stiffness matrices using different approach
4. Able to apply suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
5. Analyze a 2D problem using line, triangular, axisymmetric and quadrilateral element.
6. Analyze a 3D problem using tetrahedral and hexahedral elements.

II. MATERIALS GROUP

DEME 14611	Non -Destructive Testing
DEME 14612	Heat Treatment Processes
DEME 14613	Plastic Technologies
DEME 14614	Characterization of Materials
DEME 14615	Degradation of Materials
DEME 14616	Composite Materials
DEME 14617	Surface Science

7ᵗʰ/8ᵗʰ Semester   **DEME 14611 Non Destructive testing**

	L	T	P	C
Internal Marks : 40 | | | | |
External Marks: 60 | 4 | 0 | 0 | 4 |

Total Marks: 100

<u>**Course Outcomes**</u>

After studying this course the students will be able to:

1. Understand and recognize various Non Destructive Testing Methods (NDT) used for testing of engineering products.
2. Use NDT methods for detecting the flaws in specimen
3. Suggest suitable NDT techniques for engineering products.
4. Understand the role and benefit of NDT for improving the quality of product.
5. Magnetic analysis of steel bars and tubing
6. Measurement of thickness by ultrasonic method.

6ᵗʰ Semester   **DEME 14614 Composite Materials**

	L	T	P	C
Internal Marks: 40 | | | | |
External Marks: 60 | 4 | 0 | 0 | 4 |

Total Marks: 100

<u>**Course Outcomes:**</u>

After studying this course the student shall be able to:

1. Understand the applications of composite materials.
2. Identify various constituents of composite materials and their characteristics.
3. Suggest and use standard methods for determining mechanical properties of different types of composite materials.
4. Apply various techniques for processing of composite materials.
5. Use the basic concepts of micro-mechanics of composite laminates.
6. Analyze failure modes of composite.

III. GENERAL GROUP*

DEME 14711   Modeling and Simulation
DEME 14712   Optimization Techniques
DEME 14713   Operations Management
DEME 14714   Management Information System
DEME 14715   Entrepreneurship
DEME 14716   Industrial Engineering and Management
DEME 14717   Maintenance and Reliability Engg.
DEME 14718   Industrial Safety and Environment
DEME 14719   Disaster Management
DEME 14720   Material Management

DEME-14714 Operations Management

	L	T	P	C
Internal Marks: 40 | | | | |
External Marks: 60 | 4 | 0 | 0 | 4 |

Total Marks: 100

<u>**Course Outcomes**</u>

After studying this course, students shall be able to:

1. Understand the role of operations management in the overall business strategy of the firm.
2. Know the interdependence of the operating system with other key functional areas of the firm.

3. Identify and analyze the key factors in the design of effective operating systems.
4. Apply the operations management policies and techniques to the service sector as well as manufacturing firms.
5. Select and evaluate the survey method and technique for operations management.
6. Analyze the market research data for sales forecasting and resource planning.

DEME-14716 Industrial Engineering and Management

Internal Marks: 40   **L T P C**
External Marks: 60   **4 0 0 4**
Total Marks: 100

Course Outcomes
After studying this course, students shall be able to:
1. Know the functions and required qualities of an Industrial Engineer.
2. Apply work sampling and time study techniques for productivity improvement.
3. Identify and analyze the effect of working environment on worker's health.
4. Learn about organization structure, planning, directing, organizing and controlling techniques in the industry.
5. Understand current trends in Industrial Engineering and Management and apply the advanced techniques for tackling the related issues.
6. Adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy.

OPEN ELECTIVES
OEME 14601   Total Quality Management
OEME 14602   Industrial Engg.

6th Semester   **OEME-14601 Total Quality Management**
Internal Marks: 40   **L T P C**
External Marks: 60   **3 -- -**
Total Marks: 100
Course Outcomes
After studying this course, students shall be able to:
1. Develop an understanding on quality management philosophies and frameworks
2. Develop in-depth knowledge on various tools and techniques of quality management
3. Diagnose problems in the quality improvement process.
4. Develop analytical skills for investigating and analyzing quality management issues in the industry and suggest implementable solutions to those.
5. Propose how business leaders might plan and execute quality management strategies to gain and sustain a competitive advantage in today's global business arena.
6. Communicate why Total Quality Management (TQM) is fundamental to partnering for mutual benefit.