

19MET01: BASIC THERMODYNAMICS

Expected Course Outcomes: Upon completion of the course students will be able to:

1. Use thermodynamic terminology correctly.
2. Explain fundamental thermodynamic properties.
3. Derive and discuss the first and second laws of thermodynamics.
4. Solve problems using the properties and relationships of thermodynamic fluids.
5. Analyse basic thermodynamic cycles.
6. Students must have understanding of thermodynamic fundamentals before studying their application in applied thermodynamics.
7. The understanding of thermodynamic properties and processes will assist students in other related coursework.

19MET02:ENGINEERING MECHANICS

Expected Course Outcomes: Students are able to

1. Construct free body diagrams and develop appropriate equilibrium equations.
2. Understand the concepts of friction and to apply in real life problems.
3. Determine the centroid and Moment of Inertia for composite sections.
4. Understand the dynamic analysis of rigid body motion.

19MET03: MATERIAL SCIENCE AND METALLURGY

Expected Course Outcomes: The students will be able to

1. Provide undergraduates with a fundamental knowledge based associated materials properties, and their selection and application.
2. Acquire and develop the necessary background and skills for successful careers in the materials-related industries.
3. Furthermore, after completing the program, the student should be well prepared for Management positions in industry or continued education toward a graduate degree

19MET04: APPLIED THERMODYNAMICS

Expected Course Outcomes: The students will be able to

1. Demonstrate the principles of thermal engineering in power producing fields.
2. Differentiate among different internal combustion engine designs.
3. Recognize and understand reasons for differences among operating characteristics of different engine types and designs.
4. Analyze engineering systems needed to set-up and run engines in controlled laboratory environments.
5. Compare and contrast experimental results with theoretical trends, and to attribute observed discrepancies to either measurement error or modeling limitations.

19MET05: STRENGTH OF MATERIALS

Expected Course Outcomes: The students will be able to

1. Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.
2. Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
3. Apply basic equation of simple torsion in designing of shafts and helical spring
4. Calculate the slope and deflection in beams using different methods.

Analyze and design thin and thick shells for the applied internal and external pressures.

19MET 06: MANUFACTURING TECHNOLOGY

Expected Course Outcomes: Students undergoing this course are able to

1. Demonstrate knowledge of engineering principles (metallurgy, mechanics, and/or material science) in manufacturing processes.
2. Use appropriate machine tool equipment, standardized methods and apparatus or manufacturing processes.

19MET07: FLUID MECHANICS AND HYDRAULIC MACHINERY

Expected Course Outcomes: The students will be able to

1. Possess a sound knowledge of fundamental properties of fluids and fluid continuum and types of fluid flow.
2. Compute and solve problems on hydrostatics, including practical applications
3. Apply principles of mathematics to represent kinematic concepts related to fluid flow
4. Apply fundamental laws of fluid mechanics and the Bernoulli's principle for practical applications.
5. Compute the discharge through pipes can critically analyze the performance of pumps and turbines

19MET08: HEAT TRANSFER

Expected Course Outcomes: After learning the course the students should be able to:

1. Understand basic concept of heat transfer
2. Able to do the analytical solving in the process of heat transfer (conduction, convection and radiation)
3. Design various types of basic heat exchanger.
4. Apply scientific and engineering principles to analyze and design aspects of engineering systems that relate to conduction, convection and radiation heat transfer.

19MET09: DESIGN OF MACHINE MEMBERS – I

Expected Course Outcomes: The students will be able to

1. Analyze the stress and strain on mechanical components

2. Understand, identify and quantify the failure modes for various mechanical parts.
3. Demonstrate knowledge on basic machine elements used in machine design;
4. Design machine elements to withstand the loads and deformations for a given application, while considering specifications.
5. Approach a design problem successfully, taking decisions when there is not a unique answer.
6. Demonstrate analytical skill in the process of designing a component.

19MET10: METAL CUTTING AND MACHINE TOOLS

Expected Course Outcomes: Students will be able to:

1. Demonstrate the theory of metal cutting related to lathe, milling machines, drilling machine, grinding machines etc.
2. Select cutting tool materials and tool geometries for different metal cutting operations.
3. Select appropriate machining processes for different metal cutting processes.

Understand machine tool structures and machining economics.

19MET11: KINEMATICS OF MACHINERY

Expected Course Outcomes:The students after completing the course will be able to:

1. Familiarity with common mechanisms used in machines and everyday life.
2. Identify different mechanisms, Inversions of kinematic chains Ability to perform analysis of different types of links, position, velocity, acceleration analyses.

19MET12: METROLOGY AND INSTRUMENTATION

Expected Course Outcomes: Students are able to understand

1. The Limits, Fits and Tolerance. Indian standard system – International Standard organization system. He will know the principles of working of the most commonly used instruments for measuring linear and angular distances
2. The different types of Comparators, optical measuring instruments, flatness measurement methods and measuring methods of surface roughness. [Http://www.nptel.iitm.ac.in/](http://www.nptel.iitm.ac.in/)and for notes
3. Screw thread elements and measuring methods, Gear tooth profile measurement, CMM, Alignment tests on lathe, milling and drilling machinetools.
4. Working of various instruments used for measuring for displacement, temperature and pressure.
5. Working of various instruments used for measuring for flow, speed, stress, strain and Vibration.

19MET13: MODERN MANUFACTURING METHODS

Expected Course Outcomes: Students are able to understand:

1. Importance of non-traditional machining processes, features, classifications and applications of non-traditional methods.

2. The processes of USM and AJM, process parameters, application and limitations.
3. The Electro-chemical process and applicable in manufacturing environment in terms of accuracy, surface finish and MRR and their relative advantages and disadvantages. He has to understand the chemical machining advantages and applications.
4. The types of thermal based metal removal processes, principle of working, accuracy in machining, surface finish, tool selection and other machining parameters.
5. Its applications of electron beam and laser beam in manufacturing environment, accuracy, machining speed and etc, with respect to all non-traditional machining processes.

19MET14: DESIGN OF MACHINE MEMBERS – II

Expected Course Outcomes: The students will be able to:

1. Design various types of keys, Rigid & flexible couplings like Muff, Split muff and Flange couplings.
2. Calculate the strength and rigidity of solid & hollow shafts subjected to combine bending and axial loads.
3. Design various types of sliding contact and rolling contact bearings like journal bearings, ball bearings and roller bearings with considerations of lubrication, bearing materials, bearing life and failure.
4. Design spur and helical gears for different input conditions using the concepts of load concentration factor, dynamic load factor, bending strength, dynamic considerations and wear considerations.
5. Design major components of an IC engine such as piston, cylinder, connecting rod, crank and crank shaft using the knowledge of forces acting on these components and standard proportions.

19MET15: DYNAMICS OF MACHINERY

Expected Course Outcomes: Student will be able to

1. Analyze stabilization of sea vehicles, aircrafts and automobile vehicles.
2. Compute frictional losses, torque transmission of mechanical systems.
3. Analyze dynamic force analysis of slider crank mechanism and design of flywheel.

19MET16: OPERATIONS RESEARCH

Expected Course Outcomes: The students will be able to

1. Apply Operations Research techniques in the planning.
2. Use Operations Research techniques in the scheduling.
3. Use the various techniques of Operations Research in solving problems.
4. Importance of Operations Research in solving dynamic programming problems.
5. Apply Operations Research in the manufacturing and business applications

19MET17: CAD/CAM

Expected Course Outcomes: The students will be able to

1. Understand geometric transformation techniques in CAD.
2. Develop mathematical models to represent curves and surfaces.
3. Model engineering components using solid modelling techniques.
4. Develop programs for CNC to manufacture industrial components.

To understand the application of computers in various aspects of Manufacturing viz., Design, Proper planning, Material Handling system.

19MET20: REFRIGERATION AND AIR CONDITIONING SYSTEM

Expected Course Outcomes: The students will be able to

1. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health.
2. An ability to identify, formulate and solve engineering problems

19MET21: TURBO MACHINERY

Expected Course Outcomes: The students will be able to

1. Identify and differentiate positive displacement machines and turbo machines.
2. Analyze energy transfer through graphical and analytical methods in turbo machines.
3. know the mach number importance.

19MET22: GAS TURBINES & JET PROPULSION

Expected Course Outcomes: The students will be able to

1. Understand the working of various parts of gas turbines.
2. Determine the applicability of a given propeller system for a given aircraft.
3. Gain in problem solving for aircraft propulsion systems, in particular gas turbine engines.

19MET23: DESIGN AND MANUFACTURING OF MEMS AND MICRO SYSTEMS

Expected Course Outcomes:

1. To be able to explain what MEMS and micro systems.
2. To explain the working principles of many MEMS and micro systems in the market place.
3. To understand the relevant engineering science topics relating to MEMS and micro systems.
4. To be able to distinguish the design, manufacture and packaging techniques applicable to micro systems from those for integrated circuits.
5. To become familiar with the materials, in particular, silicon and its compounds for MEMS.

19MET24: ADDITIVE MANUFACTURING

Expected Course Outcomes: The students will be able to

1. Demonstrate the various process used in Additive Manufacturing, and will be able to analyze and select suitable process and materials used in Additive Manufacturing.
2. Identify, analyze and solve problems related to Additive Manufacturing.
3. Apply knowledge of additive manufacturing for various real-life applications.

Apply technique of CAD and reverse engineering for geometry transformation in Additive Manufacturing.

19MET25: TOOL DESIGN

Expected Course Outcomes:The students will be able to

1. Demonstrate various press working operations for mass production of sheet metal parts
2. Identify press tool requirements to build concepts pertaining to design of press tools .
3. Prepare working drawings and setup for economic production of sheet metal components
4. Select suitable materials for different elements of press tools

19MET26: FINITE ELEMENT METHODS

Expected Course Outcomes: Student will be able to

1. Apply and understand the basic concepts of Finite element analysis procedure.
2. Apply the knowledge of mathematics and engineering in solving the problems related to structural and heat transfer.
3. Use the commercial FEA packages like ANSYS and modern CAD/CAE tools for solving real life structural problems.

19MET27: DESIGN FOR MANUFACTURING

Expected Course Outcomes: Student will be able to

1. Possess customer-oriented, manufacturing and life cycle sensitive approach to product design and development, with product design principles and structured design methodologies.
2. Possess methods and approaches for developing, implementing and nurturing an effective DFM process within the firm.
3. Demonstrate the knowledge of DFMA software for case studies.

19MET29: FUELS, COMBUSTION AND ENVIRONMENT

Expected Course Outcomes:

1. Outline the basics, theory and physical concepts of fuels and combustion.
2. Recognize the different types of fuels in combustion
3. Understand and analyze the combustion process
4. Ability to characterize the fuels
5. Apply knowledge for the protection and improvement of the environment.

19MET30: AUTOMOBILE ENGINEERING

Expected Course Outcomes:

1. Identify the different parts of the automobile
2. Explain the working of various parts like engine, transmission, clutch,brakes
3. Describe how the steering and the suspension systems operate.
4. Understand the environmental implications of automobile emissions

Develop a strong base for understanding future developments in the automobile industry.

19MET31: NON CONVENTIONAL ENERGY SOURCES

Expected Course Outcomes: The students will be able to

1. Understand the different non conventional sources and the power generation techniques to generate of energy
2. Design a prescribed engineering sub-system

Recognize the need and ability to engage in lifelong learning for further developments in this field.

19MET32: PRODUCT DESIGN AND DEVELOPMENT

Expected Course Outcomes: The students will be able to

1. Approaching different product design techniques
2. Use product development process, requirements setting, conception design.
3. Apply his basic knowledge in Industrial design and product development management
4. Know customer needs and their impact
5. Apply his knowledge in product design for manufacturing and productivity.

19MET33: MECHANICAL VIBRATIONS

Expected Course Outcomes:

1. Perform free-vibration analysis of one, two, and multi degree of freedom systems.
2. Perform forced-vibration analysis of one and two degree of freedom systems
3. Design simple mechanical systems for vibrations and vibration measuring instruments

19MET34: DESIGN OF TRANSMISSIONS SYSTEMS

Expected Course Outcomes:

Upon Completion of this Course, the Students Can Able to Successfully Design Transmission Components Used In Engine and Machines

19MET35: ROBOTICS

Expected Course Outcomes:Student will be able to

1. Understand the basic components of robots, differentiate types of robots and robot grippers.

2. Model forward and inverse kinematics of robot manipulators.
3. Analyze forces in links and joints of a robot.

19MET36: SIMULATION AND MODELING OF MANUFACTURING SYSTEMS

Expected Course Outcomes: The students will be able

1. To learn different types of system and simulation
2. To build simulation model Planning, Scheduling
3. Using the model to solve various planning and design problems using modern interactive simulation tools
4. Able to generate Random Variate
5. To know basics of Simulation Languages such as GPSS, SIMSCRIPT

19MET37: AUTOMATION IN MANUFACTURING

Expected Course Outcomes: The students will be able to

1. Implement concepts of automation in machine tools and plant
2. Students will understand the fundamentals of control in automation as they apply to manufacturing.
3. Design of Pneumatic Circuit for manufacturing application
4. Design of Hydraulic Circuit for manufacturing application
5. Ability to apply PLC timers and counters for the control of industrial processes

19MEP01: ENGINEERING GRAPHICS

(Common to all branches)

Expected Course Outcome: The students will be able to

1. Prepare drawings as per standards (BIS).
2. Solve specific geometrical problems in plane geometry involving lines, plane figures and special Curves.
3. Produce orthographic projection of engineering components working from pictorial drawings.
4. Student's ability to perform basic sketching techniques will improve.
5. Students will be able to draw projections and sections, ability to produce engineered drawings will improve, will become familiar with Auto-CAD two-dimensional practice and standards.
6. Students will develop good communication skills and teamwork.

19MEP02: ADVANCED ENGINEERING GRAPHICS

Expected Course Outcomes: The students will be able to

1. Prepare sectional views of solids.
2. Estimate the sheet metal requirement for fabrication.
3. Draw orthographic drawings of combined solids and simple components.
4. Do basic exercises on a standard drafting software.

19MEP03: WORKSHOP AND MANUFACTURING PRACTICES LAB
(Common for all branches)

Expected Course Outcomes: The students will be able to

1. Fabrication of simple sheet metal parts.
2. Cut and mate the simple wooden joints.
3. Cut and mate the simple fitting joints.
4. Connect the simple household electrical circuit connections.

19MEP04: COMPUTER AIDED MACHINE DRAWING LAB

Expected Course Outcomes: The students will be able to

1. Acquire the knowledge of various standards and specifications about standard machine components.
2. Make drawings of assemblies with the help of given part drawings.
3. Select, configure and synthesize mechanical components into assemblies.
4. Able to model components of their choice using CAD software.
5. Get exposure to advanced CAD packages.

19MEP05: FUELS AND I.C ENGINES LABORATORY

Expected Course Outcomes:

1. Recognize and understand reasons for differences among operating characteristics of different engines
2. Given an engine specifications, predict performance and fuel economy trends with good accuracy
3. Based on an in-depth analysis of the combustion process, predict concentrations of primary exhaust pollutants
4. Exposure to the engineering systems needed to set-up and run engines in controlled laboratory environments
5. Learn to compare and contrast experimental results with theoretical trends. observed discrepancies to either measurement error or modeling limitations
6. Through the use of both theoretical techniques and experimentation, develop an appreciation for theoretical and practical limits to engine performance and fuel economy.

19MEP06: MATERIAL SCIENCE AND STRENGTH OF MATERIALS LAB

Expected Course Outcomes: The students will be able to

- Ability to perform different destructive testing
- Ability to characteristic materials

19MEP07: FLUID MECHANICS & HYDRAULIC MACHINERY AND HEAT TRANSFER LAB

Expected Course Outcomes: The students will be able to

1. Utilize the knowledge in the design of water supply pipe networks and measure the rate of flow in pipes and channels.
2. Get confidence in the hydraulic design of turbines and should be able to identify suitable pumps and turbines for different working conditions.
3. Evaluate the amount of the heat exchange for plane, cylindrical and spherical geometries and should be able to compare the performance of extended surface and heat exchangers.

19MEP08: MANUFACTURING TECHNOLOGY LAB

Expected Course Outcomes: Students shall be able to

1. Acquire knowledge about green sand molding process, gates and risers.
2. Determine the strength and permeability of the molding sand.
3. Demonstrate the welding procedure using Arc, Gas, TIG / MIG welding machines.
4. Acquire the knowledge about the process of making the plastic moulds.

19MEP09: DYNAMICS & INSTRUMENTATION LABORATORY

Expected Course Outcomes:

The students after completing the course will be able to:

1. Estimate the frequency response of 1DOF systems.
2. State the mode shapes of the 1DOF forced vibration systems.
3. Describe the equations of motions of forced damped vibration systems both analytical and graphical methods.
4. Analyze natural frequency of multi degrees of systems.
5. Estimate the natural frequencies of continuous systems.
6. Illustrate the static and dynamic balancing simple system.
7. Describe the static and dynamic balancing of reciprocating engines.
8. Select proper instrumentation for measuring pressure, strain, temperature etc.
9. Apply the fundamentals of control systems.
10. Apply the concepts of measurements and sensor selection.
11. Perform measurement of pressure, strain, temperature etc.
12. Calibrate instruments used for measuring pressure, strain, temperature etc.

19MEP11: CAD/CAM Laboratory

Expected Course Outcomes: The students will be able to

1. Develop 2D and 3D models using modelling software.
2. Prepare CNC part programming.