



Department of Mechanical Engineering

Delhi Technological University

Shahbad Daulatpur, Main Bawana Road
Delhi-110042, India

B.Tech. (Mechanical Engineering)

COURSE OUTCOMES (COs)

After completing this course students should be able to:

First Semester (as per NEP 2020)

S. No.	Course	Course Outcomes	
1	WORKSHOP PRACTICE	ME 103.1	Able to understand the fundamentals of workshop practices.
		ME 103.2	Able to select appropriate manufacturing processes / tools/techniques for various jobs.
		ME 103.3	Able to use various tools and machinery to make different jobs in various shops of the workshop.
		ME 103.4	Able to take care of the various hazards in workshop and apply various standard safety procedures.
		ME 103.5	Able to apply knowledge of workshop practices in fabrication and assembly of various components in
		ME 103.6	

Second Semester (as per NEP 2020)

2	THERMAL ENGINEERING - 1	ME 104.1	Students will able to understand the fundamentals of properties of steam, ideal and real gases and air water vapour mixtures.
		ME 104.2	Students will able to understand working of various Rankine vapour cycles and feed water heating arrangements for power plants
		ME 104.3	Students will be able to understand working principles of various types of boilers and boiler performance and combustion calculations.
		ME 104.4	Students will be able to understand the basic fundamentals and working principle of steam nozzle
		ME 104.5	Students will be able to understand working principles of different types of steam turbines and compounding of steam turbines

		ME 104.6	Students will be able to understand working principles of different types of steam condensers and performance of cooling towers.
3	ENGINEERING GRAPHICS	ME 106.1	Students will be able to understand the principles and uses of Engineering Graphics. Also, students will learn rules of dimensioning, lettering, scales, types of projections, different planes used in projections.
		ME 106.2	Students will be able to draw projections of point's lies in different quadrants. Also, they will understand and obtain traces, true lengths shortest length and true angles with horizontal, vertical and auxiliary planes.
		ME 106.3	Students will be able to draw projections of plane surfaces of different shapes. They will also draw the traces of plane surfaces.
		ME 106.4	Students will be able to learn different types of solids and projections and sections of solids which axis parallel, perpendicular and inclined to horizontal planes.
		ME 106.5	Students will be able to learn application of development of surfaces and draw development of different types of surfaces. Students will be able draw isometric projections of solids with different shapes.
		ME 106.6	

Third Semester

4	Engineering Materials & Metallurgy	PE 251.1	Understand the changes in the mechanical properties of a crystal structure with increased defects in the crystal structure.
		PE 251.2	Able to Correlates between the Type of Corrosion with the material composition and Operating conditions.
		PE 251.3	Able to establishes the relation between the Carbon content, Cooling rate, and Mechanical properties.
		PE 251.4	Able to Correlates the type of fracture obtainable based on the type of loading and the material used processes.
		PE 251.5	Categorises different Composite materials used in manufacturing Industry based on the matrix and the reinforcement
		PE 251.6	Chooses type of Powder Metallurgy Technique to be adopted for selected components to be manufactured in the industry.

5	Mechanics of Solids	ME 201.1	Analyse the behaviour of solid bodies subjected to various loading conditions.
		ME 201.2	Draw shear force and bending moment diagrams for beams under various loading conditions.
		ME 201.3	Apply concepts like principal stresses and theories of failure to analyse stresses in 2D and 3D elements.
		ME 201.4	Derive bending formulas and apply them to beams of various cross-sectional shapes. Derive and apply torsion equations for hollow and solid circular shafts.
		ME 201.5	Analyse columns with different end conditions and predict failure using Euler's formula, empirical formulas,
		ME 201.6	Analyse thick cylinders and calculate hoop, radial, and longitudinal stresses. Understand the stresses in compound cylinders and during shrink fits.
6	Thermal Engineering-1	ME 203.1	Students will able to understand the fundamentals of properties of steam, ideal and real gases and air water vapour mixtures.
		ME 203.2	Students will able to understand working of various rankine vapour cycles and feed water heating arrangements for power plants
		ME 203.3	Students will be able to understand working principles of various types of boilers and boiler performance and combustion calculations.
		ME 203.4	Students will be able to understand the basic fundamentals and working principle of steam nozzle
		ME 203.5	Students will be able to understand working principles of different types of steam turbines and compounding of steam turbines
		ME 203.6	Students will be able to understand working principles of different types of steam condenses and performance of cooling towers.
7	Machine Drawing and Solid Modelling	ME 205.1	Apply IS-696 & SP-46 Standards
		ME 205.2	Develop Freehand & Scale Drawings
		ME 205.3	Draft Assembly & Machine Components
		ME 205.4	Demonstrate CAD Proficiency
		ME 205.5	Translate 3D Objects to 2D Drawings
		ME 205.6	Validate Engineering Drawings
8	Engineering Analysis and Design	ME 207.1	Select the right statistical technique and tool for solving engineering problems.
		ME 207.2	To enable the students to understand various discrete

			and continuous distributions with applications.
		ME 207.3	To understand the basics of regression analysis along with application in real life situation.
		ME 207.4	To enable the students to understand basics of linear programming problems along with real life applications.
		ME 207.5	To understand the important of linear programming and related integer programming with variety of applications using soft computing.
		ME 207.6	To enable the students to understand the decision theory along with game using different methods.

Fourth Semester

9	Manufacturing Machines	PE 252.1	Ability to understand the basics of manufacturing machines
		PE 252.2	Identification and formulation of various problems in manufacturing machines
		PE 252.3	Selection of appropriate process/tool/techniques in manufacturing machines
		PE 252.4	Application of knowledge in relevance to professional practice
		PE 252.5	Lifelong learning in technological world
		PE 252.6	
10	Thermal Engineering-II	ME 202.1	Students will able to understand the working principle of reciprocating air compressor and multistage compression.
		ME 202.2	Students will able to understand the working principle of centrifugal compressor and compressor performance and vacuum pump.
		ME 202.3	Students will be able to understand analysis of various air standard cycles, performance comparison and its application.
		ME 202.4	Students will be able to understand the basic working principle of Internal combustion engines and analyse the combustion theory.
		ME 202.5	Students will be able to understand the working principle and analysis of gas turbine cycles with intercooling, reheating and regeneration including performance and application of gas turbines.

		ME 202.6	Students will be able to know the theory of Jet Propulsion and its various application, theory of Rocket engines and its different kinds.
11	Fluid Mechanics	ME 204.1	Students will be able to understand the fluid properties, flow types and concept of hydrostatic forces on various bodies.
		ME 204.2	Students will be able to understand the concept of flow lines, mass conservation principle, flow nets and vortex flow basics.
		ME 204.3	Students will be able to understand Reynolds's transport theorem, Euler's equation, Bernoulli's equation and its application and also Buckingham's pi Theorem.
		ME 204.4	Students will be able to understand the concept and analysis of laminar flow in various flow problems.
		ME 204.5	Students will be able to understand the concept and analysis of Turbulent flow in various flow problems.
		ME 204.6	Students will be able to understand the concept of Boundary layer flow theory and about flow around immersed body.
12	Kinematics of Machines	ME 206.1	To understand kinematic analysis of different mechanisms.
		ME 206.2	To interpret and analyse velocity and acceleration diagrams for various mechanism
		ME 206.3	Classify cams and analyse follower diagrams. Learn to Construct Cam profiles
		ME 206.4	To understand the working principal of Gear. Analyse simple, compound, and epicyclic gear trains.
		ME 206.5	To understand the working of steering mechanisms and straight-line mechanisms etc.
		ME 206.6	To understand the concept of friction and clutches
13	Manufacturing Technology-I	ME 208.1	Understand the basic fundamentals and applications of various casting processes.
		ME 208.2	Understand the working principles of various welding processes and selection of appropriate processes / tools/parameters for the various fabrication work.
		ME 208.3	Understand the working of various advance welding processes and able to apply the knowledge in relevance to professional practice.
		ME 208.4	Understand the Mechanical behaviour of metals in

			elastic and plastic deformation and analysis of various metal deformation processes.
		ME 208.5	Identification and formulation of various problems in various manufacturing processes.
		ME 208.6	
Fifth Semester			
14	Fluid Systems	ME 301.1	Students will be able to know and analyse the Euler's equation and about different cases of impact of jet.
		ME 301.2	Students will be able to know and analyze the various water turbine problems.
		ME 301.3	Students will be able to know and analyze the various Pump problems and also about similarity laws and model laws.
		ME 301.4	Students will be able to understand hydraulic power through pipes and nozzles, water hammer basics and about hydraulic Ram.
		ME 301.5	Students will be able to understand the hydraulic and pneumatic circuits, accumulators and intensifiers, PID controls of fluid systems.
		ME 301.6	Students will be able to know the basics and applications of computational fluid dynamics (CFD) in simple fluid problems.
15	Dynamics of Machines	ME 303.1	Analyze Flywheels & Turning Moment Diagrams
		ME 303.2	Understand Governors & Their Applications
		ME 303.3	Apply Gyroscopic Principles to Vehicles & Ships
		ME 303.4	Perform Dynamic Balancing of Mechanisms & Engines
		ME 303.5	Analyze Vibrations in Mechanical Systems
		ME 303.6	Introduction to Tribology & Friction Dynamics
16	Power Plant Engineering (DEC-1)	ME 351.1	Analyze the Indian Energy Scenario & Coal Utilization
		ME 351.2	Understand Steam Generators & Boiler Systems
		ME 351.3	Evaluate Combined & Alternative Power Plants
		ME 351.4	Apply Instrumentation & Control in Power Plants
		ME 351.5	Assess Environmental Pollution & Energy Conservation

		ME 351.6	Analyze Power Plant Economics & Selection Criteria
17	Industrial Engineering (DEC-2)	ME 361.1	Understand the basic concepts of Industrial Engineering.
		ME 361.2	Manage the product design process, facility design process and the manpower planning
		ME 361.3	Perform the demand forecasting for the decision of long, medium- and short-term time horizon
		ME 361.4	Examine the products, layout, inventory system of the organization
		ME 361.5	Develop the manpower systems and inventory systems for the efficient management of the system
		ME 361.6	Diagnose and improve the various systems of manufacturing and service organizations
18	Value Engineering (DEC-3)	ME 371.1	Explain Value Engineering Fundamentals
		ME 371.2	Apply Function Analysis Techniques
		ME 371.3	Implement VE Problem-Solving Frameworks
		ME 371.4	Evaluate Life Cycle Costs (LCC)
		ME 371.5	Organize VE Teams and Processes
		ME 371.6	Develop VE Solutions via Case Studies

Sixth Semester

19	Heat and Mass Transfer	ME 302.1	Understand the modes of heat transfer and its various applications
		ME 302.2	Formulate the general three-dimensional heat conduction equations with internal heat generation and its application
		ME 302.3	Understand the mechanism of forced and free convective heat transfer
		ME 302.4	Understand various laws of radiation and radiative heat transfer between surfaces
		ME 302.5	Describe the boiling and condensation phenomenon and understand the effectiveness and rating of heat exchangers
		ME 302.6	
20	Design of Machine Elements	ME 304.1	Apply Design Fundamentals & Material Selection
		ME 304.2	Analyze Static and Fatigue Failures

		ME 304.3	Design Mechanical Joints
		ME 304.4	Optimize Fasteners & Welded Joints
		ME 304.5	Design Springs, Shafts & Gears
		ME 304.6	Implement CAD/FEA in Design
21	Manufacturing Technology-II	ME 306.1	Demonstrate a comprehensive grasp of the theory behind metal cutting and apply this knowledge to effectively solve problems related to metal cutting processes.
		ME 306.2	Develop a fundamental understanding of the structures that constitute machine tools, enabling the analysis and evaluation of their design and functionality.
		ME 306.3	Analysing design, and conceptualises the design features of a machine tool drives and spindles, considering both theoretical principles and practical considerations.
		ME 306.4	Comprehend the working principle of advanced machining processes and able to select most appropriate machining technique for modern materials.
		ME 306.5	Apply the acquired knowledge of limits, fits and tolerances in the field of mechanical components measurements, while also exhibiting the ability to design jigs and fixtures with precision and relevance.
		ME 306.6	
22	Quality Management and Six sigma Applications (DEC-4)	ME 312-1	Explain Fundamental Quality Concepts
		ME 312-2	Compare Quality Philosophies and Frameworks
		ME 312-3	Implement Statistical Process Control
		ME 312-4	Design Acceptance Sampling Plans
		ME 312-5	Apply ISO 9000 Standards
		ME 312-6	Implement Six Sigma Methodologies
23	Computer aided Manufacturing (DEC-5)	ME 318.1	Understand NC/CNC/DNC Terminology & Operations
		ME 318.2	Analyze CNC System Components & CAM Technology
		ME 318.3	Develop CNC Part Programs Using Manual & Automated Methods
		ME 318.4	Implement Advanced CNC Programming & Sheet

			Metal Processing
		ME 318.5	Explore Reverse Engineering & Flexible Manufacturing Systems (FMS)
		ME 318.6	Apply CAD/CAPP/CIM Concepts & Robotics in Manufacturing
Seventh Semester			
24	B. Tech Project-I	ME 401.1	Ability to understand the basics of project
		ME 401.2	Identification and formulation of various problems in project
		ME 401.3	Selection of appropriate process/tool/techniques in project
		ME 401.4	Application of knowledge in relevance to professional practice
		ME 401.5	Lifelong learning in technological world
		ME 401.6	
25	Training Seminar	ME 403.1	Ability to understand the basics of Industrial Training
		ME 403.2	Identification and formulation of various problems in Industrial Training
		ME 403.3	Selection of appropriate process/tool/techniques in Industrial Training
		ME 403.4	Application of knowledge in relevance to professional practice
		ME 403.5	Lifelong learning in technological world
		ME 403.6	
26	Metrology (DEC-6)	ME 413.1	Understanding about Metrology, Principles of measurement, Sources of errors, Length Standards: Line standards, end standards and wavelength Standards, along with Slip gauges, its use and care as well as Limits, fits and tolerances
		ME 413.2	To understand the principle, types and application of Comparators along with their Characteristics, Limitation and Advantages & Disadvantages.
		ME 413.3	To understand the principle, types and instruments of Angular as well as Straightness and flatness.
		ME 413.4	To enable the students to understand about the parameters of Screw Thread and Gears, their

			Measurements and Errors.
		ME 413.5	To understand about various Machine tool tests and Alignment tests on Lathe, Milling machines and Drilling machines. Also about principle of Interferometry and its application in Metrology.
		ME 413.6	To understand different types of irregularities, standard measures for assessment and measurement of surface finish.
27	Advanced Manufacturing Processes (DEC-7)	ME 423.1	The course aims to equip students with overview and the need of advanced manufacturing processes.
		ME 423.2	To comprehend working principle of advanced manufacturing processes based on energy used such as mechanical, thermal, and Kinetic energy.
		ME 423.3	To study parametric analysis of advanced manufacturing processes such as EDM, ECM, USM, AJM, AJWM.
		ME 423.4	To study the process variables on the performance of advanced manufacturing process such as metal removal and surface finish.
		ME 423.5	To study the capabilities and limitations of the advanced manufacturing processes and the guidelines for their selection of different materials.
		ME 423.6	To learn the working principle of hybrid advanced manufacturing techniques to enhance the manufacturability.
28	Operation Research (DEC-8)	ME 427.1	To identify and develop operational research models from the verbal description of the real system.
		ME 427.2	To understand the mathematical tools that are needed to solve optimization problems.
		ME 427.3	To use mathematical software to solve the proposed models
		ME 427.4	To understand the characteristics of different types of decision-making environments and the appropriate decision-making approaches and tools
		ME 427.5	To design new simple models to improve decision – making and develop critical thinking and objective analysis of decision problems
		ME 427.6	To develop a report that describes the model and the

			solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes.
29	Non-conventional Energy Sources (DEC-9)	ME 431.1	Assess Global and Indian Energy Scenario
		ME 431.2	Design Solar Energy Systems
		ME 431.3	Develop Energy Storage Solutions
		ME 431.4	Implement Alternative Energy Systems
		ME 431.5	Evaluate Emerging Energy Technologies
		ME 431.6	Integrate Renewable Systems

Eighth Semester

29	B. Tech Project-II	ME 402.1	Demonstrate a sound technical knowledge of their selected project topic.
		ME 402.2	Undertake problem identification, formulation and solution.
		ME 402.3	Design engineering solutions to complex problems utilising a systems approach.
		ME 402.4	Conduct an engineering project.
		ME 402.5	Communicate with engineers and the community at large in written and oral form.
		ME 402.6	Demonstrate the knowledge, skills and attitudes of a professional engineer.
30	Elastic and Plastic Behaviour of Materials (DEC-10)	ME 406.1	Analyze Stress-Strain Behaviour
		ME 406.2	Utilize Generalized Hooke's Law to model elastic deformation under plane stress/strain conditions. Calculate work of deformation and distinguish between volumetric/shape changes.
		ME 406.3	Explain Plastic Deformation Mechanisms
		ME 406.4	Assess Yield and Fracture Criteria
		ME 406.5	Evaluate Fatigue and Creep Behaviour
		ME 406.6	Design for Material Performance
31	Supply Chain Management (DEC-11)	ME 412.1	Students will be able to understand the different types of uncertainties and issues in supply chain management.
		ME 412.2	Students will be able to know the importance of inventory management with concepts of risk pooling

			and Bullwhip effect in a supply chain
		ME 412.3	Students will have knowledge of resource planning to meet the fluctuating demand of the products and services in the market.
		ME 412.4	Students will have knowledge of sourcing, outsourcing and procurement of the materials
		ME 412.5	Students will have knowledge of supplier relationship management and integration with other supply chain partners.
		ME 412.6	Students will be able to know about globalization of supply chain activities and their requirement.
32	Materials Management (DEC-12)	ME 420.1	Explain Integrated Materials Management
		ME 420.2	Apply Materials Identification Techniques
		ME 420.3	Design Efficient Store Management Systems
		ME 420.4	Manage Surplus and Scrap Materials
		ME 420.5	Optimize Purchasing Processes
		ME 420.6	Evaluate Subcontracting Strategies