Revised Syllabus

ANNEXURE-I

APECET-2026

MECHANICAL ENGINEERING

Unit I: Workshop Technology and Conventions in Drawing

Basic Workshop tools and Operations in carpentry, fitting and sheet metal. Forging processes and tools - Cold and hot working processes. Pattern types – types of moulding sand and their properties - Defects in casting. Conventions in machine drawing – Production drawing – limits, fits & Tolerances – Surface finish – Specifications of standard components.

Unit II: Production Technology and Computer Aided Manufacturing Systems.

Equipment used in arc and gas welding. Modern welding methods – Submerged arc, atomic, hydrogen, CO_2, and Ultrasonic welding. Defects in welding.
Working and operations of Lathe, Drilling, Shaper, Slotter, Planner and Milling machines – Jigs, Fixtures and Jig Boring – Modern Machining processes – Ultrasonic machining, Electric Discharge Machining, Abrasive Jet Machining, Laser Beam machining and Chemical machining – Surface finishing operations – Honing, Lapping, Super finishing, Electro plating, Metal spraying.
Basic components of NC and CNC machines – CNC part programming - Manual and Computer assisted - Material handling in Computer Aided Manufacturing Systems – AGVs – Robots – Flexible Manufacturing Systems - Computer Integrated Manufacturing Systems and Rapid Prototyping.

Unit III: Engineering Materials and Solid Mechanics

Mechanical properties of materials – Destructive and Non-destructive testing of materials, Production of Iron and Steel – Iron Carbon equilibrium Diagram - Heat treatment processes – Plain Carbon and Alloy steels – Ferrous and Non-ferrous metals and alloys.

Resolution of Forces, Simple Machines, Simple stresses and strains – Shear force and bending moment diagrams – Strain energy – Deflection of beams – Torsion in shafts.

Unit IV: Theory of Machines and Design of Machine Elements

Belt and Chain drives – Velocity ratio, Belt tensions and centrifugal tension – Effect of belt thickness – Slip, lengths of open and cross belting – Power transmitted by belt, Simple, Compound, and epicyclic gear trains – Roller and Silent chains – Flywheels and Governors-Cams.

Design of – Bolted joints, Riveted joints and Welded joints - Shafts, Keys and Couplings– Bearings and Springs.

Unit V: Thermodynamics and Heat Power Engineering

Basic thermodynamics and Laws of Perfect gases, Thermodynamic processes, Air standard Cycles, fuels and combustion, I.C Engines - Two and Four stroke engines – Petrol and Diesel engines, Indicated and brake powers, Indicated and Brake thermal efficiencies, Air Compressors, Gas turbines and Jet propulsion.

Unit VI: Hydraulics and Fluid Power Systems

Basics of Fluid mechanics, Fluid Statics, Fluid Kinematics and Dynamics-Flow through pipes, Impact of Jets, Hydraulic turbines, Working principles and operation of reciprocating and centrifugal pumps, Hydraulic and pneumatic Circuit devices- Valves and Actuators.

Unit VII: Steam Boilers, Nozzles, Turbines and Condensers

Properties of Steam, Working, Performance of Boilers, Steam nozzles, Condition for maximum discharge – steam turbines – classification - Steam Condensers.

Unit VIII: Refrigeration and Air Conditioning

Methods of refrigeration, Cycles and Analysis - Air, Vapor Compression and Vapor Absorption refrigeration, Refrigeration equipment – Air Conditioning and Psychrometry – Air Conditioning Equipment and Applications of Air Conditioning.

Unit IX: Industrial Management and Engineering

Work study, Inspection and SQC - Estimation and Costing – Basics of Industrial management, organization structures and behaviour, Production and materials management, Maintenance Management and Industrial Safety, Entrepreneurial development, Principles of ISO 9000.

Unit X: Energy Sources and Power Plant Engineering

Types of Renewable energy sources – Solar energy – Wind energy – Fuel cells – MHD generator – Bio energy – Tidal energy – Thermal power plants - layout, important elements in layout and supporting activities- Nuclear Power Plants – Nuclear Energy chain reaction, Nuclear fuels, Working Principle of Nuclear reactor such as PWR and BWR.

Unit XI: E-Vehicle Technology.

E- Vehicle Technology

Definition and Necessity of E-Vehicles - Types of Electric Vehicles - Definition of Battery Electric Vehicle (BEV) - Differences between BEV and Conventional Vehicle - Advantages BEV-Functions of Parts or Configuration of a BEV with a Block diagram-Meaning Hybrid electric Vehicle (HEV), Plug-in Hybrid Electric Vehicle (PHEV)and Fuel Electric Vehicle (FCEV)