

MINIMUM CORE SUBJECT AREAS: MECHANICAL ENGINEERING

AREA	SUBJECTS / DESCRIPTION	RECOMMENDED CONTACT HOURS
All areas below are considered core for Mechanical Engineering with recommended hours specified.		
1. Solid Mechanics	- typical topics: Stress and strain; Bending & deflection of beams; Torsion of shaft; Thin-walled pressure vessels; Two-dimensional theory of elasticity; Thermal stress, disks and cylinders; Columns – stability, buckling; Failure & yielding criteria; Energy methods; Bending of plates; Finite element analysis of plane truss framework	45
2. Fluid Mechanics	- typical topics: Basic concepts on fluids; Fluid statics; Fluids in motions (streamline, Bernoulli equation); Kinematics of fluid motion (velocity and acceleration fields, Reynolds transport theorem); Flow analysis using control volume approach (continuity, linear momentum, and energy equations) potential and viscous flows; Dimensional analysis; Pipe flows (laminar and turbulent flows); Fluid machineries	45
3. Thermal Engineering	- typical topics: Basic thermodynamic concepts: system, control volume, control mass, energy; Properties of pure substance, phases and phase change; First law of thermodynamics for open and closed systems; Second law of thermodynamics; Entropy and energy; Internal combustion engines and gas turbines; Steam cycle and refrigeration; Introduction to heat transfer	45
4. Engineering Materials	- typical topics: Atomic bonding and structure of materials; Phase diagrams and diffusion; Defects and plastic deformation in the crystalline state; Mechanical Properties of materials; Fracture and fatigue; Heat treatment of steel; Classification of polymers; Mechanical properties of plastics; Corrosion	45
5. Design and Manufacturing	- typical topics: Design specification and evaluation; Drawing & design communication methods; Dimensioning and Tolerancing; Material selection; Manufacturing processes: primary, secondary and tertiary manufacturing processes; Jigs & fixture design; Process Planning and Inspection	45
6. Automatic & Control Systems	- typical topics : Introduction to control systems; Modelling of physical systems; State-space approach; Characterizing system performance; Time response analysis; Feedback control; Stability & Root-locus method; Control system design and applications	30
7. Dynamics & Mechanism	- typical topics : Kinematics & kinetics of particles; Plane motion of rigid bodies: forces and acceleration, energy and momentum methods; Introduction to free, forced and damped vibrations. Types of links and joints, degrees of freedom; Dynamic force analysis; Balancing of machines; Cam design, Gears & gear train analysis	30