



DEPARTMENT OF MECHANICAL ENGINEERING

Syllabi for Written Test: Laboratory Assistant

1. Theory of Machines and Machine Design:

Four bar linkage and link motion, Flywheels and fluctuation of energy, Power transmission by belts-V-belts and Flat belts.

Gears-Type of gears, gear profile and gear ratio calculation. Cams. Governors-Principles and classification. Design of keys, shafts, Riveted joint, couplings.

2. Engineering Mechanics and Strength of Materials:

Laws of forces, Equilibrium of Forces, Moment of Inertia, Laws of motion. Friction. Concept of simple machines. Concepts of stress and strain, Elastic limit and elastic constants.

Bending moments and shear force diagram. Stress in composite bars. Torsion in circular shafts. Columns: Euler's and Rankine's theories.

3. Basic and Applied Thermodynamics:

Thermodynamics: Heat, work and temperature, First and second laws of thermodynamics. Carnot, Rankine, Otto and Diesel Cycles. P-v & P-T diagrams H₂O. Saturated, wet & superheated steam. Definition of dryness fraction of steam, degree of superheat of steam. Rankine cycle of steam: Simple Rankine cycle, Rankine cycle efficiency with & without pump work. Concept of COP, Carnot Cycle, Vapour compression cycle.

4. Fluid Mechanics and Machinery:

Properties & Classification of Fluids, Newton's law of viscosity, Fluid Statics, Measurement of Fluid Pressure by Manometers, U-tube, Inclined tube. Fluid Kinematics: Stream line, laminar & turbulent flow, external & internal flow, continuity equation.

Dynamics of ideal fluids: Bernoulli's equation, Total head; Velocity head; Pressure head. Measurement of Flow rate, Basic Principles & working of Venturimeter, Pitot tube, Orifice meter. Hydraulic Turbines & Centrifugal Pumps.

5. Material Science and Production Engineering:

Structure of metals, Space lattice, Unit cell, BCC, FCC etc, Iron carbon diagram, Classification of Steels: mild steel & alloy steel. Heat treatment of steel.

Welding – Arc Welding, Gas Welding, Resistance Welding, Special Welding Techniques i.e. TIG, MIG, Welding Defects & Testing.

Foundry & Casting methods, defects, different casting processes.

Metal cutting principles, cutting tools. Basic Principles of machining with Lathe, Milling, Drilling, Shaping, Grinding.

6. Industrial Management, CAD/CAM, and Metrology:

Planning, Organizing, Leading, Controlling. Inventory Control, Inspection & Quality Control.

Basic concepts of CAD/CAM. NC, DNC, CNC machines.

Tools used in Linear Measurements, Angular Measurement, Surface finish. Limits, fits & Tolerance, Error.