

ANNEXURE R

Syllabus for Written test

Marks =120

120 Minutes

Theory of Machines and Machine Design:

15 Marks

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.

Engineering Mechanics and Strength of Materials:

15 Marks

Laws of forces, Equilibrium of Forces, Moment of Inertia, Laws of motion. Friction. Concept of simple machines, M A, V R, %age. 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. Thin-walled pressure vessels.

Thermal Engineering and Refrigeration & Air-conditioning:

20 Marks

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, plot on P-V, T-S, h-s planes, Rankine cycle efficiency with & without pump work. Concept of COP, Carnot Cycle, Vapour compression cycle. Refrigerants. Psychrometry, DBT, WBT, DPT.

Fluid Mechanics & Machinery:

15 Marks

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 Venturi meter, Pitot tube, Orifice meter. Hydraulic Turbines & Centrifugal Pumps

Material Science & Production Engineering:

20 Marks

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. Brazing & Soldering, Welding Defects & Testing. Foundry & Casting methods, defects, different casting processes. Forging, Extrusion etc. Metal

cutting principles, cutting tools. Basic Principles of machining with Lathe, Milling, Drilling, Shaping, Grinding. Machine tools & manufacturing processes.

Metrology and Automobile Engineering:

15 Marks

Tools used in Linear Measurements, Angular Measurement, Surface finish. Limits, fits & Tolerance, Error, Classification of Automobiles. Transmission, Steering, Braking, Suspension system. IC Engine Performance, IC Engine Combustion process, Cooling and Lubrication system in I.C Engine

Industrial Management and CAD/CAM:

20 Marks

Planning, Organizing, Leading, Controlling. Inventory Control, Inspection & Quality Control. Basic concepts of CAD/CAM. NC, DNC, CNC machines.
