

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

Syllabus for Screening Test for the post of Lecturer in Mechanical Engineering for Technical Education Department.

1. THERMODYNAMICS:

Heat, work and temperature, First and Second and Zeroth law of thermodynamics and their applications, Carnot, Otto, Diesel and Dual cycles, Properties of steam, Vapour power cycles like Rankine, modified Rankine and Reheat cycle, Regenerative cycle.

2. HEAT TRANSFER:

Steady state one dimensional heat conduction, convection and radiation, Introduction to thermal boundary layer, Heat exchanger, Boiling and condensation, Boilers, its mountings and accessories.

3. THERMAL ENERGY CONVERSION:

Introduction to S.I. and C.I. Engines, performance parameters, Gas turbine, simple cycle, Steam Nozzle, Steam turbine, velocity diagram.

4. ENVIRONMENTAL ENGINEERING.

Refrigeration Cycle, Vapour compression and Vapour absorption cycle, Properties of important Refrigerants, Psychrometric process, Application of Air conditioning, Human comfort.

5. AUTOMOBILE ENGINEERING

Transmission System – Clutch, Gear-box, Propeller Shaft, Differential, Brakes, Braking system, Steering system, Air pollution by Automobile Engines and its controls, Suspension system, Aerodynamic design of vehicle body, various safety features, Fuel System.

6. POWER PLANT ENGINEERING

Layout and working principles of thermal, hydraulic, gas and nuclear power plants, power plant. Wind power Plants, Solar power plants and other unconventional sources of power, Power plant economics, Fuel cell technology.

7. FLUID MECHANICS

Basic definitions and fluid properties, Continuity equation, Bernoullis theorem, Flow through pipes, Laminar and Turbulent flow, Application of momentum equation, Boundary layer and its control, Measurement of flow by Venturimeter ,V-notch and Pitot tube, Dimensional analysis.

8. FLUID MACHINES

Pelton, Francis and Kaplan turbine, their construction, performance and characteristics, Axial, Centrifugal and Reciprocating compressors and pumps, Cavitation in pumps, Aerodynamic design of blades, Selection of Pumps and Turbines.

9. MECHANICS OF SOLIDS:

Simple stress and strain, Hookes law, Bending moment and Shear force diagram, Torque and Torsion. Elastic and Plastic deformations, Fatigue and fracture, Theories of failure, Engineering materials.

10. THEORY OF MACHINE

Kinematics, Quadratic chain and Slider-crank mechanisms and their inversions, Power transmission-belt rope and chain, Gear Drives, Primary and Secondary Balancing, Free and Forced Vibration, Cams, Brakes and dynamometers, Governors, Gyroscope, Various types of bearings.

11 MACHINE DESIGN

Design of machine elements subjected to direct stress, Design of members subjected to bending, torsion like beam, spring, laminated spring. Design of shaft, coupling, Gear, thick and thin cylinder. CAD, Introduction to Computer Graphics, 2D and 3D Modelling and Transformations.

12. PRODUCTION ENGINEERING

Foundry – Patterns and their allowances, moulding sand and its properties, moulding and casting methods, Welding techniques – types, equipment and applications, Metal forming – Rolling, Forging, Extrusion and Drawing, Heat treatment processes. Principles of metal cutting, Various cutting tools, Tool wear and tool life, Jigs and Fixtures, Economics of machining, Types of machine tools. Standards of measurements, Limits, Fits and Tolerances, Linear and Angular measurements. Numerical control machine tools, CAM, FMS, CIMS, Newer machining methods.

13. INDUSTRIAL ENGINEERING

Business forms and organization, Financial Statements – Balance sheet, Profit and loss, Depreciation. Principles of Scientific management, Work-Study, Ergonomics. Quality management, Concept of CPM and PERT.

14. OPERATION RESEARCH AND PRODUCTION MANAGEMENT

Linear programming, Assignment, Transportation, Game Theory, Statistical quality control, Inventory control, Forecasting, Aggregate planning, MRP, MRP-II, Scheduling. Break - Even analysis, make v/s buy decision.

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Pattern of Question Paper

1. Objective type paper
2. Maximum marks- 100
3. Number of questions 100
4. Duration of paper - 2 hours
5. All question carry equal marks
6. There will be negative marking

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