RAJASTHAN PUBLIC SERVICE COMMISSON, AJMER

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

1. **THERMODYNAMICS:**
   Heat, work and temperature, First and Second law of thermodynamics and their applications, Carnot, Otto, Diesel and Dual cycles, Vapour power cycles like Rankine, modified Rankine and Reheat 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 & accessories.

3. **THERMAL ENERGY CONVERSION:**
   Introduction to S.I. and C.I. Engines, 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**
   Brakes, Braking system, Steering system, Air pollution by Automobile Engines and its controls, Suspension systems, Aerodynamic design of vehicle body, various safety features, Fuel systems.

6. **POWER PLANT ENGINEERING**
   Layout and working principles of thermal, hydraulic, nuclear power plants, Wind Power Plants, Solar Power Plants and other unconventional sources of power, power plant economics, Fuel Cell Technology.

7. **FLUID MECHANICS**
   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.

8. **FLUID MACHINES**
   Pelton, Francis and Kaplan turbines, their construction, performance and characteristics, Centrifugal and Reciprocating pump, Selection of pumps and Turbines. Cavitation in pumps, Aerodynamic design of blades, Axial flow compressors and pumps.

9. **MECHANICS OF SOLIDS:**
   Simple stress and strain, Hookes law, Bending moment and Shear force diagram, Torque and Torsion. Elastic and Plastic deformation, fatigue and fracture, theories of failure, selection of material.

10. **THEORY OF MACHINE**
    Kinematics, Quadratic chain and its inversion, power transmission- belt rope and chain, Gear Drives, Primary and Secondary Balancing, Free and Forced Vibration.

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.

12. **PRODUCTION ENGINEERING**
Principles of metal cutting, tool life, economics of machining, Types of machine tools, Numerical control machine tools, Cellular manufacturing, FMS, CIMS, Fundamental of Robots, Agile manufacturing, Lean manufacturing, Newer machining methods. Metal working, Types of cutting tool material, Heat treatment processes.

13. **INDUSTRIAL ENGINEERING**
Principles of Scientific management, concept of motivation, recruitment, training, placement and performance**.** Introduction to Supply-Chain management.

14. **OPERATIONS RESEARCH AND PRODUCTION MANAGEMENT**
Linear programming, Assignment, Transportation, Game Theory, Statistical quality control, Inventory control, Break - Even analysis, decision theory, scheduling, Group Technology, Queueing theory (M/M/C model only). Quality management. Concept of CPM and PERT.

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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