RAJASTHAN PUBLIC SERVICE COMMISSON, AJMER

Syllabus for Screening Test for the post of Assistant Drilling Engineer, Mines & Geology Department.

1. **THERMODYNAMICS:**

    Heat, work and temperature, First and Second and Zeroth law of thermodynamics and their applications, Carnot, Otto, Diesel and Dual cycles, S.I. and C.I. Engines, performance parameters, Properties of steam, Vapour power cycles like Rankine, Modified-Rankine, Reheat and Regenerative cycles, Steam Nozzle, Steam turbine and Gas Turbine.

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. **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.

4. **FLUID MECHANICS AND MACHINES:**

    Basic definitions and fluid properties, Continuity equation, Bernoulli's theorem, Flow through pipes, Laminar and Turbulent flow, Application of momentum equation, Measurement of flow by Venturimeter ,V-notch and Pitot tube, Dimensional analysis.

    Pelton, Francis and Kaplan turbine, their construction, performance and characteristics, Axial, Centrifugal and Reciprocating compressors and pumps, Cavitation in pumps.

5. **MECHANICS OF SOLIDS:**

    Simple stress and strain, Hooke's law, Bending moment and Shear force diagram, Bending and shearing stresses, Column and Struts, Torque and Torsion, machine members subjected to combined loading, Deflection of beams, Theories of failure, Principal stresses and planes.

6. **MATERIAL TECHNOLOGY:**

    Elastic and Plastic deformation of metal and alloys, Work Hardening, Creep, Fatigue and Fracture. Phase and Phase equilibrium diagrams, Heat treatment processes, Engineering materials.

7. **THEORY OF MACHINE:**

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

8. **MACHINE DESIGN:**

Design of machine elements subjected to direct stress, Design of members subjected to bending, torsion like beam, spring, laminated spring. Design of Curved Beams. Design of shaft, Coupling, Gear, thick and thin cylinder.

9. **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, Principles of metal cutting, Various cutting tools, Tool wear and tool life, Jigs and Fixtures, Economics of machining, Various 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.

10. **INSTRUMENTATION AND CONTROL SYSTEMS:**

Measurements: Accuracy, Sensibility, Uncertainty, Precision, Repeatability, Errors and their Classifications in measurements. Transducers. Measurement of Pressure, Temperature and Flow.

11. **INDUSTRIAL ENGINEERING:**

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

12. **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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Note :- Pattern of question Paper

1. Objective type paper.
2. Maximum Marks : 100
3. Number of Questions : 100
4. Duration of Paper : Two Hours
5. There will be Negative Marking
6. All Questions carry equal marks.

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