

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SYLLABUS FOR COMPETITIVE EXAMINATION FOR THE POST OF LECTURER IN MECHANICAL ENGINEERING FOR TECHNICAL EDUCATION DEPARTMENT

PAPER – I

1. Engineering Materials:

Crystal structure, space lattice, Miller indices, Imperfection in crystals, mechanism of plastic deformation, Theory of work hardening and recrystallization, concept of creep, fatigue and fracture, Phase diagrams, Heat treatment of steels, Plain carbon steel, alloy steels, effect of alloying elements in steel, composition, application and properties of common engineering materials.

2. Mechanics of Solids:

Stress and strain in two dimensions, Principal stresses and strains, isotropy and anisotropy, Uniaxial loading, thermal stresses, Bending moment and shear force diagrams, bending stresses and deflection of beams, Shear stress distribution. Torsion of shafts, helical springs. Combined stresses, Struts and columns.

3. Theory of Machine:

Kinematic analysis of mechanisms, Instantaneous centre of rotation, straight line mechanisms, steering mechanisms, Hooke's Joint, brakes and dynamometers, Cams, Governors, Gears and Gear trains, fly wheel and turning moment diagram, Friction (types), Laws of friction, Inclined plane, Ball & roller bearings, single and multiplate clutches, Balancing of rotating and reciprocating masses, Gyroscopic motion, vibration analysis of free, damped and forced vibration of single degree of freedom, Vibration isolation and transmissivity.

4. Machine Design:

Design of machine elements subjected to direct stress, Factor of safety, Stress-strain relations, Theory of fatigue, Endurance limit, S-N diagram, Design of shaft, coupling, springs, clutch, brakes, bearings, Gear, thick and thin cylinder, Concept of fracture in ductile and brittle metals, Creep behavior in metals.

5. Production Engineering:

Foundry– Patterns and their allowances, moulding sand and its properties, moulding and casting methods, Principles of welding, brazing and soldering, 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, Types of machine tools. Standards of measurements, Limits, Fits and Tolerances, Linear and Angular measurements. Numerical control machine tools, CAM, FMS, CIMS, principles of non-traditional machining processes.

6. Industrial Engineering:

Type of business, public corporations and co-operative societies. Forms of organization, management structure, work study and productivity, motion study, time study, theory of work sampling, Material handling: functions, engineering & economic factors, Production Planning and Control, Product life cycle, concurrent engineering, types of plant layout.

7. 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, Concept of CPM and PERT.

Note :- Pattern of Question Paper

- 1. Objective type paper**
- 2. Maximum Marks : 75**
- 3. Number of Questions : 150**
- 4. Duration of Paper : Three Hours**
- 5. All questions carry equal marks.**
- 6. Medium of Competitive Exam: English**
- 7. There will be Negative Marking.**