

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

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

PAPER – II

1. **Special Functions:** Hypergeometric, Confluent Hypergeometric Functions and their properties. Bessel, Legendre Function/Polynomial of first kind and their properties. Hermite, Laguerre Polynomials and their properties.
2. **Integral Transforms:** Laplace, Inverse Laplace transform and their properties. Fourier transforms Inverse Fourier transform and their properties, Hankel, Mellin transform and their properties.
3. **Differential Equations:** Classification of second order Partial Differential Equations, Green's Functions, Sturm-Liouville Boundary Value Problems, Cauchy's problems and characteristics. Calculus of variation- Variation of a functional, Euler-Lagrange's equation, necessary and sufficient condition for extrema, Variational method for Boundary Value Problems in ordinary and partial differential equations.
4. **Integral Equations:** Integral Equations of first and second kind of Fredholm and Volterra type, solution by successive substitutions and successive approximations.
5. **Differential Geometry:** Curves in space (Osculating, Normal and rectifying planes, Serret-Frenet formulae, curvature, torsion, circle of curvature and sphere of curvature), Envelopes, curves on surfaces.
6. **Mechanics:** D'Alembert's Principle, Moment and product of inertia, Motion in two-dimensions. Lagrange's equations of motion, Euler's Equations of motion, motion of a top.
7. **Numerical Analysis:** Interpolation, Difference schemes, Lagrange's interpolation, Numerical differentiation and integration. Numerical solution by Bisection, Secant, Regula-Falsi and Newton's Methods, Roots of polynomial. Linear Equation – Direct Methods (Jacobi, Gauss and Siedal Method).

8. **Operations Research:** Simplex methods, Duality, Degeneracy, Revised Simplex method, Integer Programming Problems, Assignment and Transportation Problems, Game Theory – Two person zero sum game.
9. **Mathematical Statistics:** Probability, conditional Probability, Addition and Multiplication theorems of probability, Baye's theorem, Expectations, Moment Generating Function, Probability Distributions: Binomial, Poisson, Uniform and Normal, Correlation and Regression, Line of Regressions.
10. **Three Dimensional Coordinate Geometry:** Plane, Straight Line, Sphere, Cylinder, Cone and their properties (Rectangular Coordinates only), Central Conicoids and their properties (Referred to principal axes only).

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. There will be Negative Marking.
7. Medium of Competitive Exam: Bilingual in English & Hindi.