

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER
SYLLABUS FOR COMPETITIVE EXAMINATION FOR THE
POST OF LECTURER IN MATHEMATICS FOR
TECHNICAL EDUCATION DEPARTMENT

PAPER – I

1. Algebra:

Different kinds of sets and their basic properties, Relations, type of relations, functions and kind of functions, composite functions. Groups and their properties, order of an element, order of a group, permutation groups, cyclic groups and their properties, subgroups and their properties, co-sets and their properties, Homomorphism and Isomorphism, Normal sub group and their properties.

2. Matrix and Determinants: Various types of matrices, their basic operations and properties, invertible matrices and their inverse. Determinant and their properties, solution of system of linear equations in two or three variables.

3. Differential Calculus: Limit, Continuity and Differentiability, Increasing and decreasing function, tangents and normals, Maxima and Minima of functions of one and two variables, Mean Value Theorems, Curvature, Asymptotes, Partial Differentiation, Euler's theorem, Envelopes and Evolutes.

4. Integral Calculus: Beta-Gamma functions, double and triples integrals, quadrature, rectification, surfaces and volumes.

5. Two dimensional Geometry: Circle, Parabola, Ellipse and Hyperbola and their properties (rectangular co-ordinate system only). System of Circle's and their properties.

6. Vector Calculus: Differentiation of Vectors, Del operator, Gradient, divergent, Curl and directional derivative, their identities and related theorems. Integration of Vectors, line, Surface and Volume integration of vectors, Gauss-Divergence, Stoke's and Green's theorem.

7. Ordinary Differential Equations: First order Linear and non-linear differential equation, singular solutions and extraneous Loci, Second order linear differential equation with constant and variable coefficients. Simultaneous and Total Differential equations.

8. Statics: Forces, Resultant of Forces, Law of Parallelogram, Equilibrium of co-planner forces, moments, friction, virtual work and catenaries.

- 9. Dynamics:** Velocity and acceleration along radial and transverse directions and along tangential and normal direction. Simple Harmonic motion, Rectilinear motion under various laws, Projectiles.
- 10. Complex Analysis:** Complex numbers and their algebraic properties D'Moivre's theorem and its applications, polar representation, square root of a complex number. Application in finding the roots of the equation. Separation of Real and Imaginary Part. Continuity and differentiability of complex functions, analytic function, Cauchy Riemann equations. Cauchy's theorem, Cauchy's integral formulae.

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.**