RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

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

PAPER – II

1- **Special Functions** : Beta and Gamma Functions, Hypergeometric Functions, Bessel Functions, Legendre Function of first kind, Hermite Polynomials, Laguerre Polynomials.

2- **Integral Transforms** : Laplace transform, Inverse Laplace transform, convolution theorem, Fourier transform, Inverse Fourier transform, Parseval theorem, Hankel transform, Mellin transform.

3- **Differential and Integral Equations** : Classification of second order Partial Differential Equations, Green's Functions, Sturm-Liouville Boundary Value Problems, Cauchy's problems and Characteristics, Calculus of variation, Euler-Lagrange equation.
Integral Equations of first and second kind of Fredholm and Volterra type. Solution by successive substitutions and successive approximations.

4- **Metric spaces and Topology : Metric spaces,** compactness, connectedness, Topological spaces, closed sets, closure, Dense set, Neighbourhood. Interior, exterior and boundary points, Accumulation points and derived sets. Bases and sub-bases. First and second countable spaces, separable spaces, Separation axioms, compactness, continuous functions and compact sets, connected spaces.

5- **Differential Geometry** : Curves in space, (Osculating plane, Normal plane, rectifying plane, Serret-Frenet formulae, curvature torsion, circle of curvature, Sphere of curvature), envelopes, curves on sufaces.

6- **Tensors :** Covariant, Contravariant and mixed tensors, Invariants, Addition, Subtraction and Multiplication of tensors, Contraction of tensors, Quotient law of tensors, Fundamental tensors, Associated tensors, Christoffel symbols, Covariant differentiation of tensors, Law of covariant differentiation.

7- **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.

8- **Numerical Analysis** : Interpolation, Difference schemes, Lagrange interpolation, Numerical differentiation and integration, Bisection, Secant, Regula-Faisi and Newton's Methods, Roots of polynominal. Linear Equation – Direct Methods (Jacobi, Gauss and Siedal Method).

9- **Operations Research** : Simplex methods, Duality, Degeneracy, Revised Simplex method, Integer Programming Problems, Assignment problems, Transportation Problems, Game Theory – Two person zero sum game.

10- **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.

*****

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.**