RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

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

PAPER – I

1- **Differential and Integral Calculus :** Partial Differentiation, Euler's Theorem for homogeneous functions, Total Differentiation, Maxima and Minima for two variables, Lagrange's multipliers, curvature, Asymptotes, Envelopes, Singular Points. Rectification, Multiple Integral and applications.

2- **Polar Coordinate Geometry** : Polar equation of conics, Polar equation of tangent, normal and asymptotes, chord of contact, auxiliary circle, director circle of conics.

3- **Three Dimensional Coordinate Geometry :** Plane, Straight Line, Sphere, Cylinder, Cone (Rectangular Coordinates only), Central Conicoids (Referred to principle axes only).

4- **Vector Calculus :** Differentiation and Integration of Vectors, Curl, Gradient and Divergence, their identities and related theorems.

5- **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.

6- **Partial Differential Equations :** Partial differential equation of first and higher order (Lagranges, Charpit's and Monge's Method).

7- **Mechanics** : Equilibrium of coplanner forces, moments, friction, catenary. Simple harmonic motion, Rectilinear motion under variable laws, Motion in resisting medium. Projectile**.**

8- **Abstract Algebra** :Groups – Normal Sub-groups, Quotient groups, Homomorphism, Isomorphism of groups. Classification for finite groups. Cauchy's Theorem for finite abelian groups, Permutation groups, Solvable groups, Jordan Holder Theorem, Nilpotent groups,
Rings, morphism, Principal Ideal domain, Euclidean Rings, Polynomial Rings, irreducibility criteria, Fields, finite fields, field extensions. Integral domain.

9- **Linear Algebra** : Vector Spaces, Linear dependence and independence, Bases, Dimensions, Linear transformations, Matrix representation of Linear transformations, Change of base, Algebra of Matrices, System of linear equations, Determinants, Eigenvalues and Eigenvectors, Cayley-Hamilton theorem, canonical forms, diagonal forms, triangular forms, Jordan forms, Inner product spaces, orthonormal basis, Quadratic forms, reduction and classification of quadraticforms.

10- Complex Analysis : Analytic Functions, Cauchy's Theorem, Cauchy's Integral Formulae, Power Series, Laurent's Series, Singularities, Theory of Residues, Meromorphic functions, Transformations, Contour Integration.

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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.**