RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SYLLABUS FOR COMPETITIVE EXAMINATION FOR THE POST OF ASSISTANT PROFESSOR 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 of two and three variables, Lagrange's Multipliers Method, Curvature, Asymptotes, Envelopes and Evolutes, Singular Points. Rectification, Multiple Integral, volume and surface of revolution of curves. Beta and Gamma functions.

2- **Two Dimensional Coordinate Geometry (Catesian and Polar coordinates)**: Polar equation of conics. Polar equation of tangent, normal, asymptotes and chord of contact. Auxiliary and Director circle. Second degree equation of General Conic. Centre, Asymptotes, eccentricity, foci, directrix axes and latus rectum of a conic, Co-ordinate of center, equation of conic referred to center as origin, lengths and position of axes of a standard conic.

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

4- **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, Stokes and Green theorem.

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

6- **Partial Differential Equations:** Linear and Non-linear Partial differential equation of first order. Liner Partial Differential Equations of Second Order. Solution of Partial Differential Equations by Lagrange's, Charpit's and Monge's Method.

7- **Mechanics**: Equilibrium of coplanar 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 of finite groups. Cauchy's Theorem for finite abelian groups, Permutation groups, Solvable groups and their properties.
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 bases. Inner product spaces, Orthonormal basis, Quadratic forms, reduction and classification of quadratic forms. Algebra of Matrices, Eigenvalues and Eigenvectors, Cayley-Hamilton theorem. Canonical, Diagonal, Triangular and Jordan forms, Rank of Matrix.

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

TEACHERS adda247

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Note :- <u>Pattern of Question Paper</u>

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: Bilingual in English & Hindi**
7. **There will be Negative Marking.**