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Mathematics Syllabus for Uttarakhand State Civil
Services Preliminary Exam-2011

5. MATHEMATICS

1. **Algebra:** Sets and equivalence relations. Real and complex numbers, polynomials, Integral, rational, real and complex roots of a polynomial equation, relation between roots and coefficients, repeated roots, elementary symmetric functions. Elementary theory of groups (excluding cyclic and permutation groups).
2. **Matrices:** Addition and multiplications, elementary row and column operations, inverse of a matrix, rank of a matrix, solutions of systems of linear equations, Determinants.
3. **Calculus:** (a) Functions of a single variable, Limits, Continuity, properties of Continuous functions in a closed interval, differentiability, Mean value theorems, Taylor's theorems, Maxima and Minima, application to curves; tangent, normal properties, Curvature, asymptotes, double points, point of inflexion. Partial differentiation and its applications.
(b) Definition of definite integral of a continuous function as the limit of a sum, fundamental theorem of calculus, methods of integration, rectification. Quadrature. Volume and surfaces of solids of revolution, Double and Triple integration. Applications to area, volume, center of mass and moment of inertia.
(c) Summation of series. Test for convergence of infinite series of positive terms.
4. **Differential Equations:** First order differential equations. Singular solutions, Geometric interpretations. Linear differential equations with constant coefficients.
5. **Geometry:** Two dimensional analytical geometry of straight lines and conics referred to Cartesian and polar coordinates. Three dimensional geometry for planes, straight lines, sphere and cones.
6. **Mechanics :** Vector algebra, dot and cross products of two and three vectors, moment of a force, equilibrium of coplanar forces. Common Catenary. Motion of a particle in a straight line simple harmonic motion, projectiles and central forces.