

**RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER**  
**SCHEME & SYLLABUS FOR THE POST OF ASSISTANT**  
**CONSERVATOR FOREST & FOREST RANGE OFFICER GRADE I<sup>st</sup>**  
**COMPETITIVE EXAMINATION, 2018**  
**FOREST DEPARTMENT**

**OPTIONAL SUBJECT - MATHEMATICS**

**1. Mensuration:** Perimeter and area of plane figures, Surface area and Volume of cube, cuboid, cone, cylinder, sphere, paramids and their frustum, Conversion of solid from one shape to another.

**2. Trigonometry:** Measure of angles. Trigonometrical ratios of allied angles, multiple and submultiple angles of T-ratios, trigonometrical identities. Relation between side and angles of a triangle. Height and Distance.

**3. Algebra:** Number system. Theory of equations. Relation between the roots and coefficients of general polynomial equation in one variable, Descarte's rule of signs, solution of cubic equations by Cardon's method, Biquadratic equations by Ferari's method, Continued fractions, Recurring series, Inequalities.

**4. Matrices and Determinants:** Type of matrices and their properties, inverse matrices, rank of matrix, determinant and their properties, Solution of Linear equations, cramer's rule and Caley-Hamilton theorem, Consistency and inconsistency of linear equations.

**5. Differential Calculus:** Limits, Continuity and Differentiability, differentiation of functions, Partial differentiation, Maxima and minima of two variables, Envelope and Evalute, Asymptotes, Curvature, centre of curvature, chord of curvature and related problems. Multiple points.

**6. Integral Calculus:** Double and Tripple integrals, Change of order of integration, Beta and Gamma function, quadrature, rectification, intrinsic equations, volume and surface of solid of revolutions.

**7. Ordinary and Partial Differential Equations:** Order and degree of a differential equation, formation of differential equation. Linear differential equations of first order and higher degree, clairaut's form, Linear differential

equations of constant coefficients. Ordinary homogenous differential equations, linear differential equations of second order with variable coefficients, method of variation of parameter, ordinary simultaneous differential equation and total differential equations. Partial differential equations of first order, solution by Lagrange's method and Charpit's method.

**8.Linear Programming Problem (LPP) and Operation Research:** Formation of LPP, graphical solution, feasible and optimal solutions, simplex method and its dual problems. Assignment and Transportation problems, Game Theory.

**9.Numerical Analysis:** Difference operators, Relation between operators, Newton's formulae for equal intervals, Divided difference, Relation between divided difference and simple difference. Newton's general interpolation formula, Lagrange's formula, Central difference formulas, Numerical differentiation and integrations, Solution of Algebraic and Transcendental equations, Bi-section method, Regula-Falsi method, Newton- Raphson method.

### **10.Coordinate Geometry:**

**(i) Two-Dimensional Geometry:** Distance between two points, section formula, area of triangle, Locus of a point, equations of straight line, pair of straight lines, circles, parabola, ellipse, hyperbola, their equations, general properties, tangent, normal, chord of contact, pair of tangents, conditions to represent a conic by a general equation of second degree.

**(ii)Three-Dimensional Geometry:** Distance between two points and section formula, direction cosine/ratios of a line joining two points, Cartesian equation of a line, coplaner and skew lines, shortest distance between two lines, cartesian equation of a plane, Angle between (i) two lines (ii) two planes (iii) a line and a plane, standard form of sphere, cone and cylinder with their properties.

**11.Vector Analysis:** Dot (Scalar) and cross (vector) product of two and more vectors and their properties, Gradient, Divergence and Curl, Line, surface and volume integrals. Problems related to Gauss, Stoke's and Green's theorems.

**12.Real and Complex Analysis:** Continuity and differentiability, Convergence of sequence and series. Mean value Theorems. Convergence and divergence of infinite series. Complex numbers and their properties, Argand Plane, Polar representation of complex numbers. Analytic Functions, Cauchy-Riemann's equations. Zero's and singularities of complex function and their Residues.

**13. Statistics:** Mean, Mode, Median, mean deviation, Variance and standard deviation, Probability, binomial, poisson and Normal distribution, Correlation and Regression of two variables.

**14. Statics and Dynamics:** Equilibrium of coplaner forces, common catenary, velocities and accelerations along radial and transverse directions, along tangential and normal directions, Simple Harmonic Motion, Projectile.

Note :- **Pattern of Question Paper**

- 1. Objective type paper**
- 2. Maximum Marks : 200**
- 3. Number of Questions : 120**
- 4. Duration of Paper : Three Hours**
- 5. All questions carry equal marks.**
- 6. There will be Negative Marking.**