Savitribai Phule Pune University
Department of Mathematics
M. A./M. Sc. (Mathematics)/M.Sc. (IMCA)
Entrance Examination(2026)
Syllabus

Section A

General Aptitude

Ratio and Proportion, Average, Simple Interest, Compound Interest, Height and Distance, Profit and Loss, Percentage, Area and Volume, Surds and Indices, H.C.F and L.C.M., Logarithm, Calendar, Boats and Streams, Time and Distance, Time and Work, Problems on Ages, Clock, Permutation and Combination, Probability, Problems on Numbers, Problems on Trains, Missing element in a sequence, logical reasoning.

Section B

Unit I : **Group Theory**: Groups, subgroups, abelian groups, non-abelian groups, cyclic groups, permutation groups, normal subgroups, Lagrange's theorem for finite groups, group homomorphism, isomorphism and basic concepts of quotient groups.

Unit II : **Linear Algebra**: Finite dimensional vector spaces, linear independence of vectors, basis, dimension, linear transformation, range space, null space, rank-nullity theorem, rank and inverse of a matrix, determinant, solution of linear equations, consistency conditions, eigenvalues and eigenvectors for matrices, Cayley-Hamilton theorem.

Unit III : **Real Analysis and Complex Analysis** :

(a) Sequence of real numbers, convergence of sequences, bounded and monotone sequences, convergence criteria for sequences of real numbers, Cauchy sequence, subsequences, Bolzano-Weierstrass theorem. Series of real numbers, absolute convergence, a test of convergence for series of positive terms, comparison test, ratio test, root test, Leibniz test for convergence of alternating series, uniform continuity, uniform convergence,Weierstrass M-test, Riemann integration.

(b) Complex numbers, basic algebraic properties, roots of complex numbers, analytic functions, continuity, differentiability, C-R equations, harmonic functions.

Unit IV : **Calculus and Differential Equations**

(a) Function of one variable: Limit, continuity, differentiability, mean value theorem, Roll's theorem, Taylor series, maxima, and minima.

(b) Functions of two and three variables: Limit continuity, partial derivatives, differentiability, maxima and minima.

(c) Integration as the inverse of differentiation, definite integral and their properties, fundamental theorem of calculus, double and triple integrals, change of order of integration, calculating surface area and volume using double integrals, calculating volume using triple integrals.

(d) Ordinary differential equations of the first order, Bernoulli's equation, exact differential equations, integrating factor, orthogonal trajectories, homogeneous differential equations, variable separable differential equations, linear differential equations of second order with constant coefficients, method of variation of parameters.

Unit V : **Metric Spaces**: Definition and examples of metric spaces, open sets, closed sets, interior points, boundary points, limit points, neighborhoods, closure of a set, bounded sets, connected sets, compact sets, completeness of R.

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