Syllabus
for
Mathematics (SCQP19)

Note:

i. *There will be one Question Paper which will have 100 questions.*

ii. *All questions will be complulsory.*

iii. *The Question Paper will have two Parts i.e. Part A and Part B:*

iv. *Part A will have 25 questions based on Language Comprehension/Verbal Ability, General Awareness, Mathematical/Quantitative ability and Analytical Skills.*

v. *Part B will have 75 questions based on Subject-Specific Knowledge.*

Mathematics (SCQP19)

Algebra: Groups, subgroups, Abelian groups, non-abelian groups, cyclic groups, permutation groups; Normal subgroups, Lagrange's Theorem for finite groups, group homomorphism and quotient groups, Rings, Subrings, Ideal, Prime ideal; Maximal ideals; Fields, quotient field.

Vector spaces, Linear dependence and Independence of vectors, basis, dimension, linear transformations, matrix representation with respect to an ordered basis, Range space and null space, rank-nullity theorem; Rank and inverse of a matrix, determinant, solutions of systems of linear equations, consistency conditions. Eigenvalues and eigenvectors. Cayley-Hamilton theorem. Symmetric, Skew symmetric, Hermitian, Skew-Hermitian, Orthogonal and Unitary matrices.

Real Analysis: Sequences and series of real numbers. Convergent and divergent sequences, boundedand monotone sequences, Convergence criteria for sequences of real numbers, Cauchy sequences, absolute and conditional convergence; Tests of convergence for series of positive terms-comparison test, ratio test, root test, Leibnitz test for convergence of alternating series.

Functions of one variable: limit, continuity, differentiation, Rolle's Theorem, Cauchy's Taylor's theorem. Interior points, limit points, open sets, closed sets, bounded sets, connected sets, compact sets; completeness of R, Power series (of real variable) including Taylor's and Maclaurin's, domainof convergence, term-wise differentiation and integration of power series.

Functions of two real variable: limit, continuity, partial derivatives, differentiability, maxima and minima. Method of Lagrange multipliers, Homogeneous functions including Euler's theorem.

Complex Analysis: Functions of a complex Variable, Differentiability and analyticity, Cauchy Riemann Equations, Power series as an analytic function, properties of line integrals, GoursatTheorem, Cauchy theorem, consequence of simply connectivity, index of a closed curves.

Cauchy's integral formula, Morera's theorem, Liouville's theorem, Fundamental theorem of Algebra, Harmonic functions.