

## Syllabus for screening test in Mathematics and Computing

Set, relation and function, derivative and its applications, definite integral and its applications, Determinants, matrices. Laplace Transform. Fourier series, Functions of several variables, Partial derivative and its applications.

Convergence of infinite series. Multiple integrals and their applications. Differential equation with constant coefficients. Functions of complex variables, analytic function, complex integration, Taylor series, Laurent series and Residue theorem. Numerical solution of algebraic and transcendental equations. Numerical differentiation and Integration. Iterative method for solution of system of simultaneous linear equations, numerical methods for solution of ordinary differential equations. Linear transformation and their matrix representation, Cayley-Hamilton Theorem, Hermitian, skew Hermitian and unitary matrices.

Conditional probability, Baye's Theorem, Expectation and moments, Joint and conditional distributions, Binomial, Poisson, hypergeometric, normal and exponential distributions and their applications. Linear programming problem, simplex method, transportation and assignment problem. Propositional and predicate logic, normal forms, theory of inference, boolean algebra. Basic concepts of graph, connectivity, path and circuits, shortest path algorithms, tree, spanning tree, planar graph and coloring, cut vertices and edges.

**Programming Fundamentals** - C/C++ Programming, Object oriented programming concepts using C++/Java. **Data Structures & algorithms** - Analysis of algorithms, arrays, stack, queues, linked lists, trees, Binary search tree, Graphs, Sorting and searching, Algorithm design using Greedy, Dynamic Programming, branch and bound, backtracking, Complexity theory. **Computer organization & architecture** - Introduction, CPU design, control unit design, memory organization, I/O devices. **Computer Network** - OSI, TCP/IP, Brief overview of OSI layers, IPv4, IPv6. **Cryptography and Network Security**-Traditional, Symmetric and asymmetric cryptography, modulo arithmetic, Authentication & Hash functions, IP and Network Security Protocols like PGP,S/MIME, SET, IPsec, SSL, TLS, VPN. **Database Management Systems**-basic concepts, models and languages, Database design and normalization, file organization, transaction processing, concurrency control. **Theory of Computation**- Finite automata, Regular expression, context free grammar, pushdown automata, Turing machines. **Operating System** -types, system structure, process management, CPU scheduling, deadlocks, memory management, I/O management, disk scheduling, file systems. **Computer graphics**-line, circle, ellipse drawing algorithms, line and polygon clipping, arc filling, curves and surfaces, transformations, projections. **Software Engineering** – Development life cycle models, cohesion and coupling, software metrics, cost estimation, software reliability, quality assurance and testing. **Compiler Design** – Introduction, grammar and its application, CFG, parsing, LR parsers, SLR parsing, syntax directed translation, error detection and recovery.