

Computer Sciences

Basic Mathematics

Set theory: Venn diagram, set operations, mathematical induction, functions and relations

Algebra and linear algebra: Theory of equations, complex numbers, matrices and determinants

Real and complex analysis: Basics of limit, continuity, differentiation, integration, elementary differential equations, series and sequences and their convergence, Analytic functions, Cauchy-Riemann equations, complex integration, Cauchy's theorem and formula, power series and their convergence, Taylor and Laurent series, beta and gamma functions, Laplace and Fourier transforms

Combinatorics: Sum and product rules, permutation, combination, recurrence relations, pigeon-hole principle, principle of inclusion and exclusion

Probability and statistics: Mean, median, mode, basic notion of probability, expectation, variance and standard deviation, discrete and continuous probability distributions, binomial, Poisson and normal distributions, conditional probability and Bayes theorem

Digital Logic

Switching theory: Boolean algebra, logic gates, and switching functions, truth tables and switching expressions, minimization of switching functions, Karnaugh map

Combinational logic circuits: Realization of Boolean functions using gates and multiplexers

Sequential m/c model: Flip-flops, basic design of counters

Basics of Programming

The student should be familiar with the basic concepts of programming and should be able to write programs involving the following concepts in any one of the following languages: C, C++ or Java.

Conditional constructs, iteration (loops), function or method call, recursion, recursive decomposition of a problem.

Basic notions of space and time complexity

Parameter passing mechanism, scope, binding

Arrays, lists, stacks, queues, binary tree, binary search tree

Basics of searching and sorting

Graph and its representation