

Entrance Syllabus for M.Phil. / Ph. D

Unit I

Input/Output Statements, Expressions, Operator Precedence, Loops, Conditional statements, Arrays, Pointers, Structures and unions, functions, File Handling in C and C++, Classes, Operator overloading; Function overloading; function overriding, Inheritance: Single & Multiple, Polymorphism, Static and Dynamic Binding, Templates.

Stack, Queues, Linked Lists, Trees, Heap, Hashing, Graphs, Sorting and Searching Algorithms. Logic, predicate calculus, rules of Logic, sets, functions, mathematical Induction, principles of counting, the Pigeon-Hole Principle, Permutation, combinations, repetitions, discrete probability, recurrence relations, solving recurrence relations, Relations and its types, Equivalence relations, Partially Ordered Sets (Posets, Lattices, Graph theory, spanning trees, minimal spanning trees, Transitive closure, Warshall's Algorithms, Eulerian and Hamiltonian graphs, graph coloring.

Unit II

Asymptotic notations, Time and Space Complexity, Substitution method, Iteration method, Recursion, Randomized Algorithms, Divide and Conquer, Greedy Method, Knapsack problem, Dynamic programming, All pair shortest paths, Traveling salesman problems. Backtracking, N-Queen Problem, Branch and Bound, Lower boundary theory P and NP problems. NP hard and NP complete problems.

Finite Boolean algebra, Monoids, semigroups Alphabets, Strings, and Representations, Formal Languages and Grammars, Finite State Transducers, Finite-State Automata and Regular Languages Finite-Memory Programs Recursion, Pushdown Transducers, Context-Free Languages, Turing Machines. Programs and Turing Transducers, Resource-bounded computation, More *NP*-Complete Problems, *P*-Complete Problems.

Unit III

Computer Architecture and organization, Register organization, addressing modes, memory architecture, Computational Models, programming language and architecture, Basic Computational models, Granularity, typing . Computer architecture, Description of Computer Architectures. Parallel architectures and pipelining.

System Software, Assemblers, Compilers, Operating System, Process Management, Memory Management, Virtual Memory, Paging, Segmentation, Virtual Memory Design Techniques, File Management, Multiprocessor Systems.

Numerical Techniques Errors, Types of Equations, Algorithms to Compute Roots of Equation, Algorithms to Solve Systems of Linear Algebraic Equations, Algorithms to solve Ordinary Differential Equations, Algorithms to find integrals.

Unit IV

Elementary Database Concepts. Hierarchical, Relational, Network and OO Database Architectures and their comparison. Data Modeling. Relational model, algebra and Constraints. SQL.

Software engineering, Software Engineering Challenges, Software standard, CMMI), process patterns software process models, Process Planning, Estimation, COCOMO Model, Project Scheduling and Risk management, Coupling and Cohesion, CASE.

Networks, LAN, MAN & WAN architectures., OSI Reference Model Architecture, TCP/IP architectural model. Autonomous systems and Internetwork Routing. Classful IP addresses. Subnetting, IP Multicasting. Sliding window protocol, Internet Protocol(IP), Internet control protocols: ICMP, ARP and RARP. Routing algorithms: Interior(OSPF), Exterior(BGP). Transport Layer: UDP and TCP concepts.