

SYMBIOSIS INTERNATIONAL (DEEMED UNIVERSITY)
Ph D ENTRANCE TEST

The Syllabus of Computer Science Engineering

Discrete Mathematics

Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Groups. Graphs: connectivity, matching, coloring. Combinatorics: counting, recurrence relations, generating functions.

Linear Algebra

Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition. **Calculus:** Limits, continuity and differentiability. Maxima and minima. Mean value theorem. Integration.

Probability

Random variables. Uniform, normal, exponential, Poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.

Research Methodology

Research Statistics like measures of central tendency, dispersion and correlation and regression, Sampling distributions, Design of Experiment

Data Structures and Algorithms

Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs, Algorithms: Searching, sorting, hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer, Graph search, minimum spanning trees, shortest paths.

Theory of Computation

Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and context-free languages, pumping lemma. Turing machines and undecidability.

Operating System and advanced computing

Inter process synchronization. Uni-processor Deadlock, Memory management and virtual memory. Distributed System: Distributed Deadlocks, Mutual Exclusion, Shared Memory and Distributed

File system, Introductory concepts to Advanced computing methodologies like cloud computing, cluster, grid computing and Map-Reduce strategy

Databases

Relational model: RDBMS and SQL, Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

Data mining techniques and data ware housing,

Denormalization, Big Data basics, No-SQL basics

Computer Networks

Concept of layering. LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state), Subnetting, TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP).

Basics of Wi-Fi. Network security: authentication, key cryptography, digital signatures and certificates, firewalls.

Software Engineering:

Software Development Models, Estimation, Project planning, Software Testing

Object oriented Software Development: Object oriented concepts, UML diagrams and notations, OO modelling, introduction to the concepts of design patterns

Programming Skills

C, C++, Java basics, Advanced java concepts like JSP, Servlets, Working with Databases including RDBMS and No-SQL data stores

Basics of statistical programming languages like R and Matlab

