

DEPARTMENT OF INFORMATION TECHNOLOGY



NIT

NATIONAL
INSTITUTE OF
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HAZRATBAL, SRINAGAR 190006

Syllabus for Entrance Examination for Ph.D. Admission

Section A

Section A1: Algorithms [5 Questions]

Searching, sorting, hashing. Asymptotic worst-case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph traversals, minimum spanning trees, shortest paths.

Section A2: Programming and Data Structures [5 Questions]

Programming in C, Recursion, Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Section A3: Computer Networks [5 Questions]

Concept of layering, LAN technologies (Ethernet), Flow and error control techniques, switching, IPv4/IPv6, routers and routing algorithms (distance vector, link state).

Section A4: Databases [5 Questions]

ER-model, Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

Section A5: Computer Organization and Architecture [5 Questions]

Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining. Memory hierarchy: cache, main memory, and secondary storage

Section A6: Operating System [5 Questions]

Processes, threads, inter-process communication, concurrency, and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems.

Section B

Section B1: Artificial Intelligence [3 Questions]

Knowledge representation and reasoning, Neural Networks, Expert Systems

Section B2: Wireless and Mobile Communication [3 Questions]

Cellular Wireless Networks, Wireless Access Techniques, Wireless Systems and Standards, Mobile communication, Mobile and Wireless Security

Section B3: Cloud Computing [3 Questions]

Virtualization, Cloud Services, Cloud Security, Cloud Storage, Cloud Computing Standards

Section B4: BigData [3 Questions]

Big Data Management, Hadoop, Map Reduce, Big Data Analytics, Data Modelling, Data Measure Techniques.

Section B5: Computer Graphics and Image Processing [3 Questions]

Transformations, 2D and 3D representation, Curves and Surfaces, Detection Methods, Computer Animation, Digital Image Formation, Image Enhancement, Image Restoration, Image Segmentation.

Section C [15 Questions]

Section C1: General Aptitude.

Section C2: Engineering Mathematics.

Discrete Mathematics: Propositional and first order logic. Sets, relations, functions.

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