

Syllabus for Entrance Examination for Ph.D. Admission in Information Technology Department of Information Technology

Section 1: Propositional and first order logic, Sets, relations, functions, Monoids, Groups, Graphs, connectivity, matching, coloring, Combinatorics, Linear Algebra, Matrices, eigenvalues and eigenvectors, Probability and Statistics, Random variables, Uniform, normal, exponential, poisson and binomial distributions, Mean, median, mode and standard deviation, Digital Logic Boolean algebra, Combinational and sequential circuits, Minimization, Number representations and computer arithmetic.

Section 2: Programming and Data Structures, Computer Programming, Programming in C, JAVA and Python, Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs. Searching, sorting, hashing, Asymptotic Notation, Time and space complexity, Algorithm design and analysis, Graph traversals, minimum spanning trees, Prims, Kruskal algorithm.

Section 3: Computer Networks, OSI/TCP Model, IPv4/IPv6, routers and routing algorithms, Ethernet, error detection, Flow, error and access control, circuit and virtual circuit-switching, framing, Medium Access Control, Ethernet bridging, Routing protocols, shortest path, flooding, distance vector and link state routing; Fragmentation and IP addressing, IPv4, CIDR notation, ARP, DHCP, ICMP, Transport layer: flow control and congestion control, UDP, TCP, sockets; Application layer protocols: DNS, SMTP, HTTP, FTP, Wireless network, GSM, 3G/4G/5G, cryptography, Cellular Wireless Networks, Wireless Access Techniques, Wireless Systems and Standards, Mobile communication, Mobile and Wireless Security, network security.

Section 4: Operating System, System call, Processes, process scheduling and management, threads, inter-process communication, concurrency, and synchronization, Mutual exclusion, Deadlock, CPU and I/O scheduling, Memory management and virtual memory, File systems, UNIX, UNIX commands. Databases, ER-model, Relational model, relational algebra, tuple calculus, SQL, Integrity constraints, Normal forms, File organization, indexing, and concurrency control. Databases ER-model, Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms, File organization, indexing, Transactions and concurrency control.

Section 5: Artificial Intelligence and Machine learning, Knowledge representation and reasoning, Neural Networks, Expert Systems, Deep learning, Virtualization, Cloud Services, Cloud Security, Cloud Storage, Cloud Computing Standards, SaaS, PaaS, IaaS, Virtualization, Virtual machine, CloudSim, Cloud security, Big Data Management, Hadoop, Map Reduce, Big Data Analytics, Data Modeling, Data Measure Techniques.