

Paper-II

01. SYLLABUS FOR COMPETITIVE EXAMINATION FOR THE POST OF TEACHING ASSOCIATE IN COMPUTER SCIENCE

Unit-1 Computer Organization and Architecture: Number representation and computer arithmetic (fixed and floating point). Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Machine instructions and addressing modes, ALU and data-path, CPU and control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage.

Unit-2 Computer Programming: Programming in C: Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps, File handling. Object-oriented programming: Class, Object, inheritance, polymorphism and overriding, constructors & destructors, overloading, exception handling.

Unit-3 Software Engineering: Software development Life Cycle and different models, Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance.

Unit-4 Operating System: Main functions and different types of OS. Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems. The Unix system: file systems, process Management, Bourne shell, shell variable, command line programming, filters and Unix commands, system calls.

Unit-5 Computer Networks: LAN, MAN, WAN, Transmission Media: Guided and unguided, Multiplexing (TDM, FDM, SDM & WDM) and switching techniques, Routing algorithms, Network reference models: OSI Model, TCP/IP Model, TCP/UDP and Sockets, IPv4 / IPv6, DNS , Network Security: Symmetric & Asymmetric Cryptography, Message Digest, Block and Stream Ciphers, One time pad, IP Security, E-Mail Security: PGP, IDS, Firewall.

Unit-6 Discrete Mathematical Structures: Counting principles, linear recurrence, mathematical induction, relations and functions, predicate and propositional logic. Graph: Definition and properties, connected graph, cycles & circuits, Tree: rooted tree, spanning trees. Models of Computability: Regular Expressions and Finite Automata. Context free grammars and Push down Automata. Regular and Context free languages, pumping lemma. Turing Machines and undecidability.

Unit-7 Data Structures and Algorithms: Analysis, Asymptotic notation, Notions of space and time complexity, Best, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and conquer; Tree and graph traversals, Spanning tree algorithms, Shortest paths; Hashing, Sorting, Searching. Basic concepts of complexity classes P, NP, NP-hard, NP-complete.

Unit-8 Database Management System: ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normalization-1NF, 2NF, 3NF, BCNF and

4NF), Structured Query languages (SQL), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.

Unit-9 System Software: Assemblers: one pass & two pass assemblers design, Macros & Macro processors, loaders & linkers, Text editors & debuggers, Program generators, Compiler & Interpreter, Different phases of compilation process.

Unit -10 Emerging Trends and Technologies: Concept of Parallel Computing (Parallel Virtual Machine and Message passing Interface) Mobile Computing: Cellular system, Handoff, Location Management, Pervasive Computing, WLAN, E-Technologies: E-commerce framework and applications, Business models, electronic payment System: Digital Token, Smart Cards, Credit Cards, risks in e-payment systems. Data Warehousing and Data Mining.
