Computer Science and Engineering, Information Technology, Artificial Intelligence & Master of Computer Applications

(Section 1-9: 50 Marks)
(Section -10: 50 Marks)

Section 1: Digital Logic
Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

Section 2: Computer Organization and Architecture
Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining, pipeline hazards. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

Section 3: Programming and Data Structures
Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Section 4: Algorithms
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 5: Theory of Computation
Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and contex- free languages, pumping lemma. Turing machines and undecidability.

Section 6: Compiler Design
Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation. Local optimisation, Data flow analyses: constant propagation, liveness analysis, common subexpression elimination.

Section 7: Operating System
System calls, processes, threads, inter process communication, concurrency and synchronization. Deadlock. CPU and I/O scheduling. Memory management and virtual memory. File systems.

Section 8: Databases
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 9: Computer Networks

Concept of layering: OSI and TCP/IP Protocol Stacks; Basics of packet, circuit and virtual circuit-switching; Data link layer: framing, error detection, Medium Access Control, Ethernet bridging; Routing protocols: shortest path, flooding, distance vector and link state routing; Fragmentation and IP addressing, IPv4, CIDR notation, Basics of IP support protocols (ARP, DHCP, ICMP), Network Address Translation (NAT); Transport layer: flow control and congestion control, UDP, TCP, sockets; Application layer protocols: DNS, SMTP, HTTP, FTP, Email.

Section 10:

Research Aptitude: Research: Meaning, Characteristics and types; Steps / Methods of Research; Research Ethics; Research and Scientific Methods; Deductive Vs Inductive Research; Defining and formulating the research problem; Important concepts related to Research design; Computing skills for scientific research

Reading Comprehension and Communication: Unseen passage based on a research article; Nature of Scientific Communication; Barriers of Communication

Reasoning: Number series; Letter series; Alphabetical codes; Structure of Arguments; Analytical Reasoning

Data Interpretation: Measures of Central Tendency, Standard Deviation & Error; Basic probability; Graphical Representation and Mapping of Data; Quantitative and Qualitative Data Analysis

Information and Communication Technology (ICT): ICT: Meaning, advantages, disadvantages and usage General abbreviations and terminologies; Basics of internet and emailing

Note: Due weightage should be given for all units of the syllabus