

Sardar Vallabhbhai National Institute of Technology
Computer Engineering Department
ICCR MTech Admission
Syllabus for Written Examination – June 2021

1. Engineering Mathematics

Discrete Mathematics: Propositional and first-order logic. Sets, relations, functions, partial orders and lattices. Groups. Graphs: connectivity, matching, coloring.

2. Computer Organization and Architecture

Number representation and arithmetic / logical operations, ALU, data-path and control unit. Instruction pipelining. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

3. Programming and Data Structures

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

4. 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, and shortest paths.

5. 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 un-decidability.

6. Compiler Design

Lexical analysis, parsing, syntax-directed translation, Runtime environments, Intermediate code generation.

7. Operating System

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

8. Databases

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

9. Computer Networks

Concept of layering, LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state), TCP/UDP and sockets, congestion control, Application layer protocols (DNS, SMTP, POP, FTP, HTTP), Basics of Wi-Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.