**Section1:**

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

partial orders and lattices. Groups. 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.

**Numerical Analysis –**Numerical Solutions of Algebraic and transcendental equations, Finite

differences, Interpolation (For equal and unequal intervals) Numerical solutions of first order

differential equations, Numerical Integration

**Probability& Statistics:** Random variables. Uniform, normal, exponential, Poisson and binomial

distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes

theorem.

**Section 2:**

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

**Section 3:**

1. Computer Organization and Architecture Machine instructions and addressing modes.
2. ALU,
3. data‐path and control unit.
4. Instruction pipelining.
5. Memory hierarchy: cache, main memory
6. secondary storage;
7. I/O interface (interrupt and DMA mode).

**Section 4:**

1. Programming and Data Structures Programming in C.
2. Recursion. Arrays,
3. stacks, queues,
4. linked lists, trees,
5. binary search trees, binary heaps,
6. graphs.

**Section 5:**

1. Algorithms Searching,
2. sorting, hashing.
3. Asymptotic worst case time and space complexity.
4. Algorithm design techniques: greedy, dynamic programming and divide‐and‐conquer.
5. Graph search, minimum spanning trees, and shortest paths.

**Section 6:**

1. Theory of Computation Regular expressions and finite automata.
2. Context-free grammars and push-down automata.
3. Regular and context-free languages, pumping lemma.
4. Turing machines and undecidability.

**Section 7:**

1. Compiler Design Lexical analysis,
2. parsing,
3. syntax-directed translation.
4. Runtime environments.
5. Intermediate code generation.

**Section 8:**

1. Operating System Processes,
2. threads,
3. inter‐process communication,
4. Concurrency and synchronization.
5. Deadlock.
6. CPU scheduling.
7. Memory management and virtual memory.
8. File systems.

**Section 9:**

1. Databases ER‐model.
2. Relational model: relational algebra, tuple calculus,
3. SQL. Integrity constraints, normal forms.
4. File organization, indexing (e.g., B and B+ trees).
5. Transactions and concurrency control.

**Section 10:**

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