Table of Contents:

Candidates appearing for the Graduate Aptitude Test in Engineering (GATE) Examination 2024 can choose from among 29 subject papers. There is a detailed syllabus for every paper. Read on to find out the syllabus of **Computer Science and Information Technology (CS)**. It contains ten sections that cover various topics and sub-topics.

Section 1: Engineering Mathematics

Discrete Mathematics:

- Graphs: connectivity, matching, coloring
- Combinatorics: counting, recurrence relations, generating functions
- Propositional and First Order Logic
- Monoids, Groups
- Sets, Relations, Functions, Partial Orders and Lattices

Linear Algebra:

- Matrices
- System Of Linear Equations
- Determinants
- LU Decomposition
- Eigenvalues and Eigenvectors

Calculus:

- Maxima and Minima
- Integration
- Mean Value Theorem
- Limits, Continuity and Differentiability

Probability and Statistics:

- Mean, Median, Mode And Standard Deviation
- Conditional Probability And Bayes Theorem
- Uniform, Normal, Exponential, Poisson and Binomial Distributions

- Random Variables

Section 2: Digital Logic

- Boolean Algebra
- Number Representations And Computer Arithmetic (Fixed And Floating Point)
- Minimization
- Combinational And Sequential Circuits

Section 3: Computer Organization and Architecture

- I/O Interface (Interrupt And DMA Mode)
- ALU, Data-Path And Control Unit
- Memory Hierarchy: Cache, Main Memory And Secondary Storage
- Machine Instructions And Addressing Modes
- Instruction Pipelining, Pipeline Hazards

Section 4: Programming and Data Structures

- Recursion
- Programming in C
- Arrays, Stacks, Queues, Linked Lists, Trees, Binary Search Trees, Binary Heaps, Graphs

Section 5: Algorithms

- Algorithm Design Techniques: Greedy, Dynamic Programming And Divide-And-Conquer
- Graph Traversals, Minimum Spanning Trees, Shortest Paths
- Searching, Sorting, Hashing
- Asymptotic Worst Case Time And Space Complexity

Section 6: Theory of Computation

- Turing Machines And Undecidability
- Regular Expressions And Finite Automata
- Regular And Context-free Languages, Pumping Lemma
- Context-free Grammars And Push-down Automata

Section 7: Compiler Design

- Runtime Environments
- Lexical Analysis, Parsing, Syntax-Directed Translation
- Local Optimisation, Data Flow Analyses: Constant Propagation, Liveness Analysis, Common Subexpression Elimination

- Intermediate Code Generation

Section 8: Operating System

- File Systems
- System Calls, Processes, Threads, Inter-Process Communication, Concurrency And Synchronization
- Deadlock
- Memory Management And Virtual Memory
- CPU And I/O Scheduling

Section 9: Databases

- Integrity Constraints, Normal Forms
- ER-Model
- Transactions And Concurrency Control
- File Organization, Indexing (E.g., B And B+ Trees)
- Relational Model: Relational Algebra, Tuple Calculus, SQL

Section 10: Computer Networks

- Fragmentation And IP Addressing, IPv4, CIDR Notation, Basics Of IP Support Protocols (ARP, DHCP, ICMP), Network Address Translation (NAT)
- Basics Of Packet, Circuit And Virtual Circuit-Switching
- Transport Layer: Flow Control And Congestion Control, UDP, TCP, Sockets
- Routing Protocols: Shortest Path, Flooding, Distance Vector And Link State Routing
- Concept Of Layering: OSI And TCP/IP Protocol Stacks
- Application Layer Protocols: DNS, SMTP, HTTP, FTP, Email
- Data Link Layer: Framing, Error Detection, Medium Access Control, Ethernet Bridging