

# GATE Syllabus

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## 1 Syllabus:

### 1.1 Engineering Mathematics:

#### 1.1.1 Discrete Mathematics:

- ☐ Propositional and First Order Logic
- ☐ Sets
- ☐ Relations
- ☐ Functions

- ☐ Partial Orders and Lattices
- ☐ Monoids
- ☐ Groups
- ☐ Graphs
  - ☐ Connectivity
  - ☐ Matching
  - ☐ Coloring
- ☐ Combinatorics
  - ☐ Counting
  - ☐ Recurrence Relations
  - ☐ Generating Functions

### **1.1.2 Linear Algebra:**

- ☐ Matrices
- ☐ Determinants
- ☐ Systems of Linear Equations
- ☐ Eigenvalues and Eigenvectors
- ☐ LU Decomposition

### **1.1.3 Calculus:**

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

#### **1.1.4 Probability and Statistics:**

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

#### **1.2 Digital Logic:**

- ☐ Boolean Algebra
- ☐ Combinational and Sequential Circuits
- ☐ Minimization
- ☐ Number Representation and Computer Arithmetic
  - ☐ Fixed Point
  - ☐ Floating Point

#### **1.3 Computer Organization and Architecture:**

- ☐ Machine Instructions and Addressing Modes
- ☐ ALU
- ☐ Data path and Control Unit
- ☐ Instruction Pipelining
- ☐ Pipeline Hazards
- ☐ Memory Hierarchy
  - ☐ Cache
  - ☐ Main Memory
  - ☐ Secondary Storage
- ☐ I/O Interface
  - ☐ Interrupt
  - ☐ DMA Mode

#### **1.4 Programming and Data Structures:**

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

#### **1.5 Algorithms:**

- ☐ Searching
- ☐ Sorting
- ☐ Hashing
- ☐ Asymptotic
  - ☐ Space Complexity
  - ☐ Time Complexity
- ☐ Algorithm Design Techniques
  - ☐ Greedy
  - ☐ Dynamic Programming
  - ☐ Divide and Conquer
- ☐ Graph Traversals
- ☐ Minimum Spanning Trees
- ☐ Shortest Paths

## **1.6 Theory of Computation**

- ☐ Regular Expression and Finite Automata
- ☐ Context Free Grammars
- ☐ Push down automata
- ☐ Regular and Context Free Languages
- ☐ Pumping Lemma
- ☐ Turing Machines and Undecidability

## **1.7 Compiler Design**

- ☐ Lexical Analysis
- ☐ Parsing
- ☐ Syntax-Directed Translation
- ☐ Runtime Environments
- ☐ Intermediate Code Generation
- ☐ Local Optimization
- ☐ Data flow Analysis
  - ☐ Constant Propagation
  - ☐ Liveness Analysis
  - ☐ Common Sub Expression Elimination

## **1.8 Operating System**

- ☐ System Calls
- ☐ Processes
- ☐ Threads
- ☐ Interprocess Communication
- ☐ Concurrency and Synchronization

- ☐ Deadlock
- ☐ CPU and I/O Scheduling
- ☐ Memory Management and Virtual Memory
- ☐ File Systems

### **1.9 Databases**

- ☒ E-R Model
- ☐ Relational Model
  - ☒ Relational Algebra
  - ☐ Tuple Calculus
- ☒ SQL
- ☒ Integrity Constraints
- ☒ Normal Forms
- ☒ File Organization
- ☐ Indexing (B & B+ Trees)
- ☐ Transactions and Concurrency Control

### **1.10 Computer Networks**

- ☐ Concept of Layering
  - ☐ OSI 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
  - ☐ Link State Routing
- ☐ Fragmentation and IP addressing
- ☐ IPv4
- ☐ CIDR Notation
- ☐ IP Support Protocols
  - ☐ ARP
  - ☐ DHCP
  - ☐ ICMP
  - ☐ NAT (Network Address Translation)
- ☐ Transport Layer
  - ☐ Flow Control
  - ☐ Congestion Control
  - ☐ UDP
  - ☐ TCP
- ☐ Sockets
- ☐ Application layer protocols
  - ☐ DNS
  - ☐ HTTP
  - ☐ SMTP
  - ☐ FTP
  - ☐ EMAIL