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GATE - 2027



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COMPUTER SCIENCE & INFORMATION TECHNOLOGY

Previous **GATE** Questions with Solutions,
Subjectwise and Chapterwise

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Foreword

Dear Students,

The style, quality and content of the Solutions for previous GATE Questions of Computer Science & Information Technology, will encourage the reader, especially the student whether above average, average or below average to learn the concept and answer the question in the subject without any tension. However, it is the reader who should confirm this and any comments and suggestions would be pleasantly received by the Academy.



The student should not miss to go through the solutions for conventional questions asked prior to 2003, as more concepts are brought out in them that will facilitate to answer the numerical answer questions, Common data and Linked answer questions, if any, easily.

The student is advised to solve the problems without referring to the solutions. The student has to analyze the given question carefully, identify the concept on which the question is framed, recall the relevant equations, find out the desired answer, verify the answer with the final key such as (a), (b), (c), (d), then go through the hints to clarify his answer. This will help to face numerical answer questions, better. The student is advised to have a standard text book ready for reference to strengthen the related concepts, if necessary. The student is advised not to write the solution steps in the space around the question. By doing so, he loses an opportunity of effective revision.

It is believed that this book is a Valuable aid to the students appearing for competitive exams like IES, JTO, DRDO, ISRO and Other PSUs. This book can also be used by fresh Teachers in Engineering in improving their Concepts.

General Aptitude Previous Questions & Solutions of GATE of all branches are available in a separate booklet.

With best wishes to all those who wish to go through the following pages.

Y.V. Gopala Krishna Murthy,
M Tech. MIE,
Chairman & Managing Director,
ACE Engineering Academy,
ACE Engineering Publications,
Frost Interactive Service Pvt. Ltd. (ACE ONLINE).

Syllabus for Computer Science & Information Technology (CSIT)

Discrete Mathematics

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.

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.

Probability and Statistics: Random variables. Uniform, normal, exponential, poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem

Theory of Computation

Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and contextfree languages, pumping lemma. Turing machines and undecidability.

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.

Database Management Systems

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.

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.

Data Structures

Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Programming Languages

Programming in C. Recursion.

Operating Systems

System calls, processes, threads, inter-process communication, concurrency and synchronization.

Deadlock. CPU and I/O scheduling. Memory management and virtual memory. File systems.

Digital Logic

Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

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

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).

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