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GATE
Practice Booklet

Bits & Bytes

VOLUME - I

COMPUTER SCIENCE & INFORMATION TECHNOLOGY

1116 Expected Questions with Solutions

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Foreword

Dear Students,

Solutions of all previous GATE Questions are already available. Every year about 20% of questions will have repetitive nature. However, rest of the questions are from untapped areas (never asked areas). Keeping this in view, possible questions are prepared in various subjects (chapter wise) along with their hints/solutions. The student is advised to practice the questions systematically so that their chances of getting high score in GATE Exam will increase.

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.

As observed in the GATE Exam, number of sets may be possible, being online exams. Hence, don't skip any subject. All are equally important. It is believed that this book is a Valuable aid to the students appearing for competitive exams like ISRO and Other PSU's. This book can also be used by fresh Teachers in Engineering in improving their Concepts.

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

Mathematical Logic: Propositional Logic, First-order Logic.

Probability: Random variables and expectation, Conditional probability, Independent random variables, Distributions (Uniform, Normal, Exponential, Poisson, Binomial), Mean, Median, Mode and Standard Deviation.

Set Theory: Sets, Relations, Partial orders, Lattices, Functions, Groups, Recurrence relations, Generating functions.

Combinatorics: Counting, Recurrence relations, Generating functions.

Elementary graph theory: Basic properties, Connectivity, matchings, Coloring.

Linear Algebra: Algebra of Matrices, Determinants, Systems of linear equations, Eigen values & Eigen vectors, LU decomposition for systems of linear equations.

Calculus: Limit, Continuity & Differentiability, Mean value Theorems, Integration, Partial derivatives, Maxima & Minima.

Theory of Computation

Regular languages and finite automata, Context free languages and Push-down automata, Recursively enumerable sets and Turing machines, Undecidability.

Compiler Design

Lexical analysis, Parsing, Syntax directed translation, Runtime environments, Intermediate code generation.

Database Management Systems

ER-model, Relational Model (Relational Algebra, Tuple Calculus), Database Design (Integrity Constraints, Normal Forms), Query Languages (SQL), File Structures (Sequential Files, Indexing, B and B+ Trees), Transactions and Concurrency Control.

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.

Data Structures

Arrays, Stacks, Recursion, Queues, Linked Lists, Trees, Binary search trees, AVL trees, Graphs and Hashing

Programming Languages

Programming in C; Recursion

Operating Systems

Processes, Threads, Inter-Process Communication, Concurrency and Synchronization, Deadlock. CPU 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 Search, Minimum Spanning Trees, Shortest Paths.

Computer Organization and Architecture

Machine Instructions and Addressing Modes. ALU, Data-Path and Control Unit. Instruction Pipelining. Memory Hierarchy: Cache, Main Memory and Secondary Storage; I/O Interface (Interrupt and DMA mode).

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