

INFORMATION TECHNOLOGY
BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-IV IT : WINTER: 2025
SUBJECT: APPLIED ALGORITHM

Day : Wednesday
Date : 03/12/2025

W-29319-2025

Time : 10:00 AM-01:00 PM
Max. Marks : 60

NB :

1. All questions are COMPULSORY.
2. Figures to the right indicate FULL marks for the question.
3. Draw neat labelled diagrams WHEREVER necessary.
4. Assume suitable data, if necessary.

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|-----------|---|------|
| Q. 1 | What are the key characteristics that define an algorithm? | (10) |
| OR | | |
| Q. 1 | What is asymptotic analysis, and how is it used to describe the best, average, and worst-case behavior of an algorithm? | (10) |
| Q. 2 | How do we analyze the Brute-Force technique in solving problems, and what are its advantages and disadvantages? | (10) |
| OR | | |
| Q. 2 | What is the Divide and Conquer technique, and how can we analyze its approach in breaking problems into subproblems? | (10) |
| Q. 3 | Explain the concept of in Dynamic Programming in detail with example? | (10) |
| OR | | |
| Q. 3 | How does pruning work in Backtracking, and why is it essential for improving efficiency? | (10) |
| Q. 4 | Explain the concept of Self-Balancing Trees and their importance in maintaining balance. | (10) |
| OR | | |
| Q. 4 | Describe how B Trees work and their application in database indexing. | (10) |
| Q. 5 | Define the P, NP, NP-complete, and NP-hard classes and explain their significance in computational theory. | (10) |
| OR | | |
| Q. 5 | What is Cook's Theorem, and how does it relate to the NP-completeness of problems? | (10) |
| Q. 6 | What are Approximation algorithms, and how are they used to find near-optimal solutions? | (10) |
| OR | | |
| Q. 6 | Explain the concept of Randomized algorithms and how they introduce randomness to problem-solving. | (10) |
