AOA — Analysis of Algorithms

Scanned question papers, topic-wise · Dec 2025 (QP 99073) + May 2026 (QP 14659)

Every question is the original scanned print from the university paper — nothing re-typed.

SOLVING QUESTIONS

Topic-wise · Dec 2025 + May 2026 · 18 questions

1. Recurrence Relations — Master Method & Recursion Tree

Dec 2025 · Q1a · 3 marks

a) Find the complexity of given recurrence relation using Master Method 03

$T(n) = 8T(n/2) + n^2$

May 2026 · Q1a · 3 marks

a) Solve the following recurrence relation using recursion tree method: 03

$T(n) = 3T(n/3) + n^2$

2. Sorting — Selection, Merge & Insertion Sort

Dec 2025 · Q2a · 5 marks

Q2) a) Sort the following numbers using the Selection Sort, and show the array after each pass: 05

28, 17, 20, 75, 13, 15

Dec 2025 · Q2b · 10 marks

b) Write an algorithm for Merge Sort. Derive its time complexity. 10

Sort the following elements using Merge Sort

32, 55, 17, 48, 64, 26

May 2026 · Q2b · 10 marks

b) Sort the following elements using Merge Sort and hence derive the complexity of Merge Sort: 34, 9, 56, 10, 78, 61, 98, 23, 38. 10

May 2026 · Q3a · 5 marks

Q3) a) Sort the following elements using insertion sort: 05

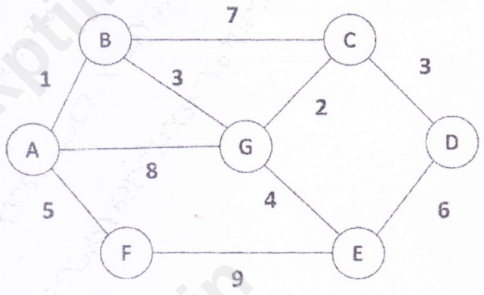
90. 1. 4, 2, 78, 45, 39. 58, 79

Show output after each pass. Also, derive complexity of insertion sort.

3. Minimum Spanning Tree — Kruskal & Prim

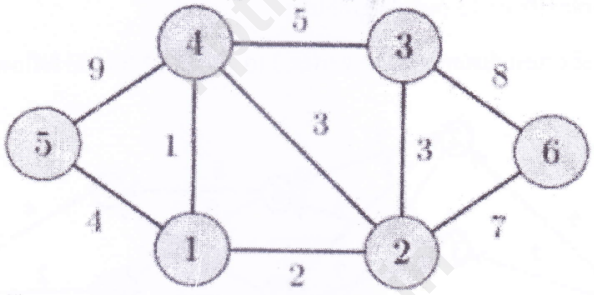
Dec 2025 · Q3b · 10 marks

b) What is Minimum Cost Spanning Tree? Write Kruskal's algorithm and state its time complexity. **10**
Find Minimum Cost Spanning Tree for following graph using Kruskal's Algorithm



May 2026 · Q2a · 5 marks

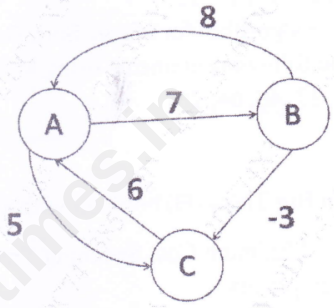
Q2) a) Find the Minimum spanning tree for the following graph using Prim's algorithm: **05**



4. Shortest Path — Floyd-Warshall, Dijkstra & Multistage

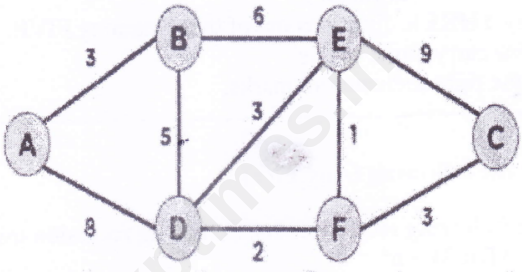
Dec 2025 · Q6a · 5 marks

Q6) a) Find the All-Pair Source Shortest path for all the vertices using Floyd-Warshall Algorithm **05**



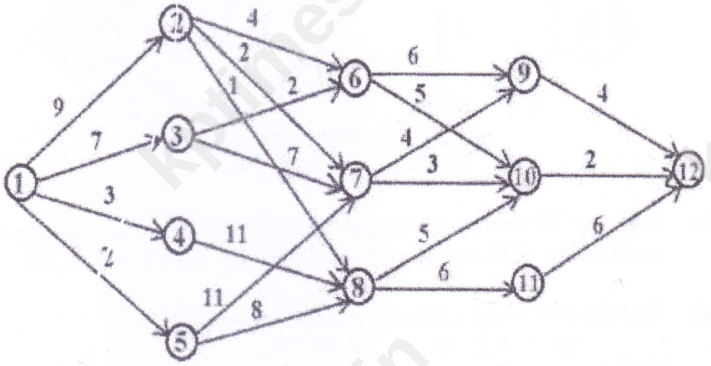
May 2026 · Q3b · 10 marks

b) Find the shortest path for the following graph using Dijkstra's algorithm: **10**
(Source vertex is A)



May 2026 · Q5b · 10 marks

b) Find the shortest distance form vertex 1 to vertex 12 for the following graph: **10**



5. Knapsack Problem — Fractional & 0/1 (DP)

Dec 2025 · Q4a · 5 marks

Q4) a) Consider a Knapsack with capacity W = 16. There are six items with following weights and profits. **05**

(P1, P2, P3, P4, P5, P6) = (10, 5, 15, 7, 6, 18)

(W1, W2, W3, W4, W5, W6) = (2, 3, 5, 7, 1, 4)

Find the maximum profit using Fractional Knapsack algorithm

2/2

May 2026 · Q4b · 10 marks

b) Solve the following knapsack problem using dynamic programming: (Capacity = 7) **10**

Item	Weight	Profit
I1	1	50
I2	2	40
I3	4	70
I4	5	80
I5	1	10

6. Longest Common Subsequence (LCS)

Dec 2025 · Q4b · 10 marks

b) Write an algorithm to find Longest Common Subsequences between two given strings. Derive its time complexity. **10**

Find the LCS between following strings

X = AVANTIKA

Y = KARNAVATI

May 2026 · Q1d · 3 marks

d) Find the LCS for the following sequences: **03**

X = ABCDE Y = ACE

7. Backtracking Problems — N-Queen, 15-Puzzle & Sum of Subset

Dec 2025 · Q5b · 10 marks

b) What is the N-Queen Problem? Design a backtracking algorithm to solve it Provide step-by-step working of it using suitable example. 10

May 2026 · Q5a · 5 marks

Q5) a) Draw the partial state space tree for 15-puzzle problem. Specify the complexity of 15 puzzle problem. 05

May 2026 · Q6c · 5 marks

c) Solve the following sum of subset Problem: $S = \{3, 4, 5, 6\}$ and sum = 9 05

THEORY QUESTIONS

Topic-wise · Dec 2025 + May 2026 · 16 questions

1. Divide & Conquer and Searching — Binary Search

Dec 2025 · Q1b · 3 marks

b) Write an algorithm for Binary Search 03

May 2026 · Q1b · 3 marks

b) Explain Divide and Conquer strategy with diagram. 03

2. Greedy Method & Dynamic Programming Concepts

Dec 2025 · Q1c · 3 marks

c) Explain the general method of the Greedy Approach. 03

Dec 2025 · Q1d · 3 marks

d) Explain the Principle of Optimality as applied to Dynamic Programming. 03

3. Asymptotic Notations — Big Theta & Others

Dec 2025 · Q3a · 5 marks

Q3) a) Explain Big Theta (Θ) notation with a suitable example. 05

May 2026 · Q6a · 5 marks

Q6) a) Explain the different asymptotic notations with graphs. 05

4. Knapsack — Theory (Fractional vs 0/1)

May 2026 · Q1c · 3 marks

c) Differentiate between fractional and 0/1 knapsack problem (give minimum 5 relevant points). 03

5. String Matching — Naive, Rabin-Karp & KMP

Dec 2025 · Q1f · 3 marks

f) Explain the Naive String-Matching Algorithm. 03

Dec 2025 · Q6c · 5 marks

c) Write Rabin Karp String Matching Algorithm. State its time complexity. 05

May 2026 · Q1f · 3 marks

f) Explain the advantage of KMP algorithm over Naïve string matching algorithm. 03

May 2026 · Q6b · 5 marks

b) Explain KMP String matching algorithm with example. 05

6. Backtracking & Branch and Bound (incl. Graph Coloring)

Dec 2025 · Q1e · 3 marks

e) Differentiate between Backtracking and Branch & Bound techniques. 03

May 2026 · Q1e · 3 marks

e) Explain the concept of Branch and Bound. 03

Dec 2025 · Q6b · 5 marks

b) Explain Graph Coloring method with suitable example 05

May 2026 · Q4a · 5 marks

Q4) a) Explain backtracking and how it is used to solve the graph coloring problem. 05

7. Multistage Graph — Theory

Dec 2025 · Q5a · 5 marks

Q5) a) What is Multistage Graph? Explain Forward Approach method to find optimal path in Multistage Graph. 05

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