

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Assume suitable data if necessary.

Q.1 Write a note on performance measures of algorithm with appropriate example. [10]

OR

Explain best, average and worst case of complexity for recursive algorithm.

Q.2 Write a 'c' code to CREATE, INSERT and DELETE operations in Threaded Binary Tree. [10]

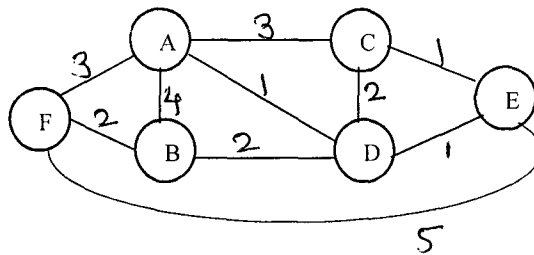
OR

What is Red Black Tree? Write the properties of Red Black Tree. Explain all possible scenarios to insert a node in red black tree.

Q.3 What is topological sort? Write an algorithm to construct a topological sort for a graph. [10]

OR

Write the steps for finding minimum spanning tree using Kruskal's algorithm. Also draw and find the cost of minimum spanning tree using Kruskal's for given graph.



Q.4 What is string matching problem? Explain Knuth-Morris-Pratt algorithm for string matching with example. [10]

OR

What is string matching problem? Explain Boyer-Moore algorithm with example. How Knuth-Morris-Pratt (KMP) string searching algorithm differs from the Brute-force algorithm?

Q.5 Explain with an example heap sort method using a priority queue. [10]

OR

What is External Sorting? Sort the following data using basic external sorting:
81, 94, 11, 96, 12, 35, 17, 99, 28, 58, 41, 75, 15.

Q.6 What is Dynamic Programming? Explain various steps involved in developing a dynamic programming for 0/1 knapsack problem. [10]

OR

Solve the following TSP using dynamic programming.
Distance matrix:

$$C = \begin{bmatrix} 0 & 2 & 9 & 10 \\ 1 & 0 & 6 & 4 \\ 15 & 7 & 0 & 8 \\ 6 & 3 & 12 & 0 \end{bmatrix} \quad \text{and} \quad \begin{aligned} g(2, \phi) &= C_{21} = 1 \\ g(3, \phi) &= C_{31} = 15 \\ g(4, \phi) &= C_{41} = 6 \end{aligned}$$

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