

BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - V CS&BS : WINTER : 2024
SUBJECT: DESIGN & ANALYSIS OF ALGORITHMS

Day : Monday
Date : 02/12/2024

W-24166-2024

Time : 02:30 PM-05:30 PM
Max. Marks : 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of **CALCULATOR** is allowed.

- Q.1 Explain following methods to solve recurrences with suitable examples. (10)
- 1) Substitution Method
 - 2) Recursion Tree Method
 - 3) Master's Method

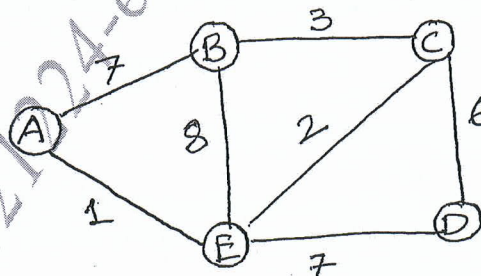
OR

- Q.1 a) Write a note on: Time and Space trade-off. (05)
- b) Write a note on: Performance measurement of an algorithm. (05)

- Q.2 What are Greedy algorithms? Discuss important properties of these algorithms. Explain how are they different from Divide and Conquer & Brute Force techniques. (10)

OR

- Q.2 Write an algorithm to find the shortest path in a graph from a single source that uses Greedy Strategy. Also discuss the running time of the algorithm. Find out the shortest path in the given graph considering A as the source node. (10)



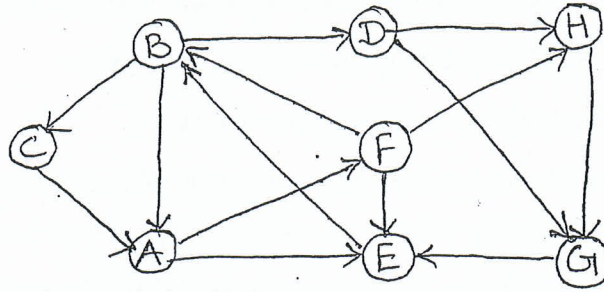
- Q.3 Explain with suitable example. (10)
- 1) LIFO Branch and Bound
 - 2) FIFO Branch and Bound
 - 3) LC Branch and Bound

OR

- Q.3 Explain Dynamic Programming strategy for Huffman's coding. Write the algorithm and discuss the running time of the algorithm. Find Huffman's codes for the input [5,5,5,2,2,3,3,3,3,4,4,4,4,4]. (10)

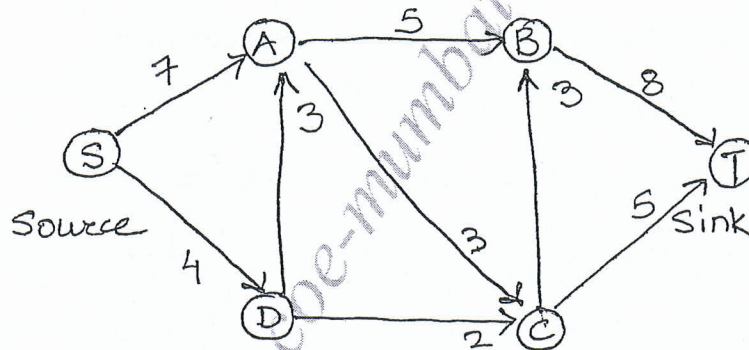
(P.T.O.)

- Q.4 Write an algorithm for Depth First Search Graph Traversal. Discuss its running time. Apply on the given graph. (10)



OR

- Q.4 Discuss the Maximum Network Flow problem as an optimization problem using Ford Fulkerson's algorithm. Find out the Maximum Network Flow in the given graph considering S as source and T as sink. (10)



- Q.5 Explain the P class, NP class, NP-Hard and NP-Complete problems. (10)

OR

- Q.5 Prove that 3CNF is NP-Complete. (10)

- Q.6 Explain in detail how Approximation algorithms strike balance between computational efficiency and solution quality when tackling NP-Hard optimization problems. (10)

OR

- Q.6 Discuss how do Quantum computing principles influences the design and analysis of algorithms compared to classical computing with a suitable example. (10)

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