BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - V Computer Science & Business Systems : WINTER : 2023
SUBJECT : DESIGN & ANALYSIS OF ALGORITHMS

Day : Thursday | Time : 02:30 PM-05:30 PM
Date : 30-11-2023 | **W-24166-2023** | Max. Marks : 60

N.B.

1) All questions are **COMPULSORY**.
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Use of non-programmable calculator is allowed.

Q.1 a) Explain characteristics of algorithm. **(05)**

b) Solve the recurrences using any appropriate method **(05)**

i) $T(n) = 8T(n/2) + n$
ii) $T(n) = 2T(n/3) + n$

OR

Q.1 a) Explain performance analysis for Insertion Sort using its algorithm. **(05)**

b) Solve the Recurrences by using any appropriate method **(05)**

i) $T(n) = 2T(Ln/2) + \theta(n)$
ii) $T(n) = T(n-1) + T(n-2)+1$

Q.2 What is greedy strategy? Write algorithm for Huffman's coding. Discuss running time. Solve the numerical. **(10)**

Char	a	b	c	d	e	f	g	h
Freq.	350	150	100	50	300	20	10	30

OR

Q.2 Explain how greedy algorithm works. Write an algorithm for Fractional Knapsack. Discuss its running time. Solve the following numerical. **(10)**

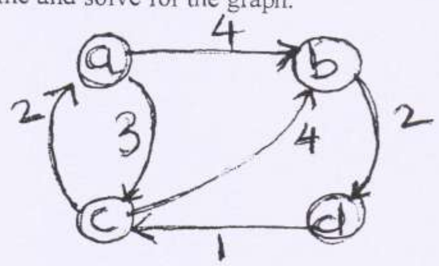
i	1	2	3	4	5	6	7
W_i	10	10	10	20	20	30	40
P_i	30	50	60	100	75	130	150

Q.3 What is Back Tracking strategy? Explain how to solve following problems using Back Tracking. **(10)**

i) Subset sum problem.
ii) Graph coloring.

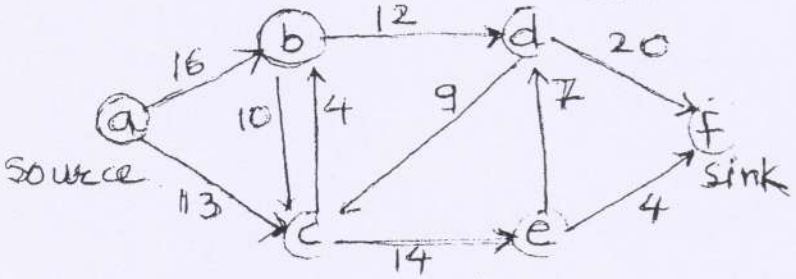
OR

Q.3 What is Dynamic Programming? How it is different than Divide and Conquer. Write an algorithm to find all pair shortest path. Discuss the running time and solve for the graph. **(10)**



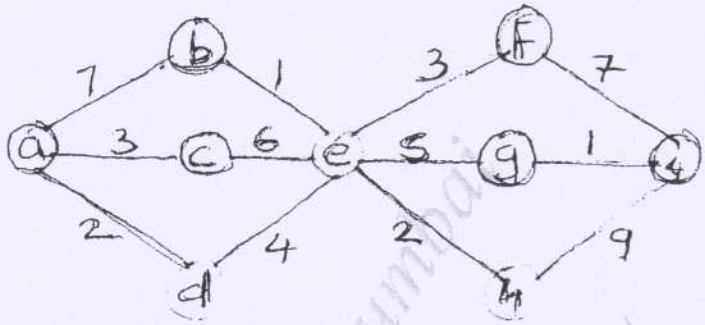
P.T.O.

Q.4 What is a network Flow graph? Write Ford Fulkerson's algorithm to solve maximum network flow. Solve for the following graph. **(10)**



OR

Q.4 What is a Minimum Spanning Tree (MST)? Write An MST algorithm that uses Greedy strategy. Discuss running time. Solve for the graph. **(10)**



Q.5 Define P, NP, NP-Hard and NP complete. Prove Hamiltonian Cycle is NPC. **(10)**

OR

Q.5 Define P, NP, NP-Hard and NP complete. Prove 3CNF is NPC. **(10)**

Q.6 What are Las Vegas and Monte Carlo techniques? Explain with examples? **(10)**

OR

Q.6 Write short note on: **(10)**

i) P SPACE problems
ii) Quantum Algorithms

* * * * *