

Total No. of Questions : 7]

SEAT No. :

P561

[Total No. of Pages : 3

[5840]-102

M.Sc. (Computer Science)

CSUT-112 : DESIGN AND ANALYSIS OF ALGORITHMS

(2019 Pattern) (Semester-I)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *All questions are compulsory*
- 2) *Neat diagrams must be drawn wherever necessary.*

Q1) Solve any FIVE of the following.

[5×2=10]

- a) Define O and give one example.
- b) Define
 - i) Cross edge
 - ii) Tree edge
- c) What are Limitations of Merge-sort?
- d) What is shortest path? When we use Bellman-Ford algorithm.
- e) Define sum of subset problem.
- f) Define FIFOBB and LIFOBB.

Q2) Solve the following.

- a) Explain heap sort with proper example. **[5]**
- b) X be a sequences = $\langle a, a, b, a, b \rangle$ y = $\langle b, a, b, b \rangle$ let the cost associated with edit operation, insert and delete be 1 and change is 2. Find the total minimum cost of transformation of X to Y using dynamic programming. **[7]**

P.T.O.

Q3) Explain strassen's multiplication algorithm. Solve the.

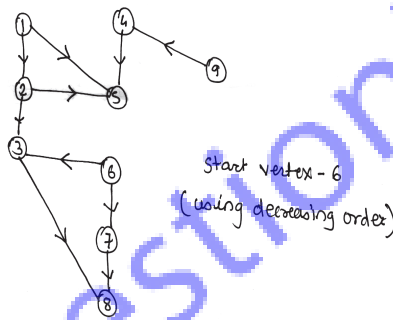
- a) Following by using strassen's multiplication to find matrix Product.

$$A = \begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 3 & -4 \\ -4 & 2 \end{bmatrix} = B \quad [7]$$

- b) What is Longest common subsequence. Find LCS of X & Y where
 $X = \langle 1, 0, 0, 1, 0, 1, 1, 0 \rangle$
 $Y = \langle 1, 1, 0, 1, 0 \rangle$ [5]

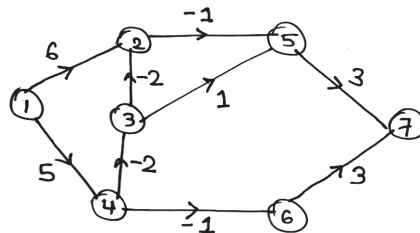
Q4) Solve the following.

- a) Explain algorithm to construct HuFFman code. obtain a set of optimal HuFFman codes for the messages ($m_1, m_2, m_3, m_4, m_5, m_6, m_7$) with relative frequencies (4, 5, 7, 8, 10, 12, 20) [7]
- b) Find the topological sort of the given directed graph? [5]



Q5) Attempt the following.

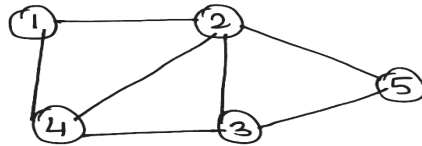
- a) Give any 2 algorithm which are used to find out shortest path. Use Bellman-Ford algorithm to find shortest path from 1. [7]



- b) Find optimal solution to the Knapsack instances $n=7$ $m=15$ [5]
 $(P_1, P_2, \dots, P_7) = (10, 5, 15, 7, 6, 18, 3)$
 $(w_1, w_2, \dots, w_7) = (2, 3, 5, 7, 1, 4, 1)$
 (Use Greedy method)

Q6) Solve the following.

- a) What is m-coloring problem. For the following graph show that only 06 solution is exist. If graph is colored using exactly 3 colors. [7]



- b) Explain insertion sort. Apply insertion sort on following numbers. [5]
85, 24, 63, 45, 17, 31, 96, 50,

Q7) Solve any Two from the following.

- a) State Cook's theorem. Give it's significance. [2×6=12]
b) Solve the given instance of TSP by using reduced cost matrix method

$$\begin{bmatrix} \infty & 20 & 30 & 10 \\ 15 & \infty & 16 & 4 \\ 3 & 5 & \infty & 2 \\ 19 & 6 & 18 & \infty \end{bmatrix}$$

- c) Define 4 queen's problem. Draw state space tree to Find solution for 4 queen's problem using backtracking.

