

Paper Code: CO-208

Title of the subject: Algorithm Design and Analysis

Time: 1:30 Hours

Max. Marks: 25

Note: Answer all questions. Write pseudo code for all algorithms asked.
Assume suitable missing data, if any.

1. Solve following recurrences

(i) $T(n) = 3T(n/4) + \Theta(n^2)$ using recursion tree method

(ii) $T(n) = 6T(n/3) + n^2 \log n$ using Master's Method (5)

2. Write algorithm for Huffman coding and find Huffman codes for following data

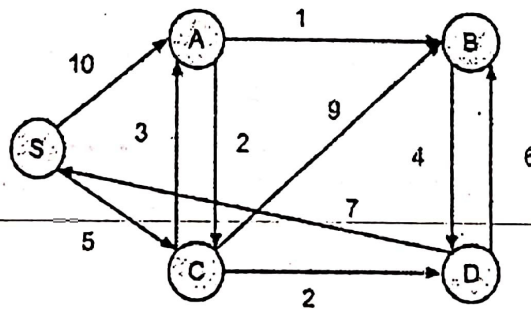
Character	a	b	c	d	e	f	g
Frequency	37	18	29	13	30	17	6

Compute average code length for given data. (5)

3. You are given n events where each takes one unit of time. Event i will provide a profit of g_i dollars ($g_i > 0$) if started at or before time t_i where t_i is an arbitrary real number. (Note: If an event is not started by t_i then there is no benefit in scheduling it at all. All events can start as early as time 0.) Give the most efficient algorithm you can to find a schedule that maximizes the profit.

(5)

4. Apply Dijkstra's algorithm to find Single source shortest path for following graph:



(5)

5. Suppose you are given an array $A[1..n]$ of sorted integers that has been circularly shifted k positions to the right. For example, $[35, 42, 5, 15, 27, 29]$ is a sorted array that has been circularly shifted $k = 2$ positions, while $[27, 29, 35, 42, 5, 15]$ has been shifted $k = 4$ positions. We can obviously find the largest element in A in $O(n)$ time. Describe an $O(\log n)$ algorithm.

(5)