

uestions carry equal marks.
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- 1A. List out and briefly explain the performance measures of an algorithm. (3)
- 1B. Develop an algorithm for binary search. Validate the algorithm with a suitable data set. (3)
- 1C. Write function to add and delete an item into a singly linked list and display the list. (4)
- 2A. Define algorithm. Explain the specifications of algorithms. (3)
- 2B. Evaluate the following expression using stacks.

$$4^2 + (5*4)^2 - 18/3 \tag{3}$$

- 2C. i. Write the expression tree for $4 + 3 \times 7 5/(3 + 4) + 6$ (2) ii. Write an algorithm to insert a key element into a binary search tree. (2)
- 3A. Given a rod of length *n* inches and an array of prices that contains prices of all pieces of size smaller than *n*. Determine the maximum value obtainable by cutting up the rod and selling the pieces. For example, if length of the rod is 8 and the values of different pieces are given as following, then the maximum obtainable value is 22 (by cutting in two pieces of lengths 2 and 6) length $1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8$

Which algorithm design technique is best suitable for this rod cutting problem. And justify your answer. (3)

3B. Solve the recurrence
$$T(n) = 2T\left(\frac{n}{2}\right) + n$$
 (3)

3C. Explain various binary tree traversal techniques with the help of tree in Fig.(a).



- 4A. Explain briefly traversing algorithms of a graph with reference to graph in Fig.(**b**).
 - 4B. Write an algorithm to find factorial of a number recursively and analyze the same. (4)
 - 4C. Find the tree corresponding to post order sequence 0, 2, 4, 6, 5, 3, 1, 8, 10, 9, 7.
 - 5A. Given a value V, if we want to make change for V Rs, and we have infinite supply of each of the denominations in Indian currency, i.e., we have infinite supply of { 1, 2, 5, 10, 20, 50, 100, 500, 2000 } valued coins/notes, what is the minimum number of coins and/or notes needed to make the change? For example, V=171 Rs and we need a 100 Rs, 50 Rs, 20 note and 1 Rs coin. For this problem which algorithm design approach would help, justify your answer.
 - 5B. Discuss average case time complexities of sorting algorithms and which algorithm is efficient. (3)
 - 5C. What is Dijkastra algorithm for finding the shortest path? Describe its working for the following graph Fig.(c). (4)



- 6A. Write a function for sorting 'n' numbers using merge sort. Illustrate the working with an example. (5)
- Define minimum spanning tree. Describe any one algorithm for finding the 6B. minimum cost spanning tree with respect to graph in Fig.(d). (5)

(4)