Reg. No. ☐☐☐☐☐☐☐☐☐

First Semester M.Sc. Degree Examination, December 2018/January 2019
COMPUTER SCIENCE
Algorithmics

Time : 3 Hours   Max. Marks : 70

*Note : Answer **any five full** questions. **All** questions carry **equal** marks.*

1. a) Differentiate between BigO and Omega notation with example.   **6**

   b) Design an algorithm to check whether all the elements in a given array is distinct or not. Derive its worst complexity.   **8**

2. a) Explain the properties of Heap data structure along with a diagram.   **7**

   b) What is Hashing ? Explain double hashing with suitable example.   **7**

3. a) What is an AVL tree ? Explain about the different rotation patterns used to balance AVL tree.   **7**

   b) Explain deletion operation of Binary Search Tree. Discuss the various cases. **7**

4. a) Start with an empty Red-Black tree, insert the following keys in the given order :

   40, 50, 70, 30, 42, 15, 20, 25. Draw figures depicting the tree immediately after each insertion and following the rebalancing.   **8**

   b) Compare and contrast various balanced binary search trees.   **6**

5. a) State Job sequencing problem. Discuss how do you solve job sequencing problem using greedy approach.   **7**

   b) Write a pseudo code using divide and conquer technique to perform merge sort for a given unsorted array of N numbers.   **7**

6. a) Solve subset sum problem for the set s = {3, 5, 6, 7} and d = 15. Construct a state space tree.   **7**

b) What is Dynamic Programming strategy ? Find the optimal solution for the 0/1 knapsack problem for the given set of items using dynamic programming approach. **7**

Weight	Values
2	3
3	4
4	5
5	6

7. a) Explain Breadth First Traversal algorithm for graphs. Mention its applications. **7**

b) Find the Optimal Binary Search Tree for the elements and frequencies given below. **7**

Element	12	15	20	25
Frequency	4	3	6	2

8. a) Define Minimum Spanning Tree (MST). Using Kruskal's algorithm, find the MST for given weighted graph. **8**
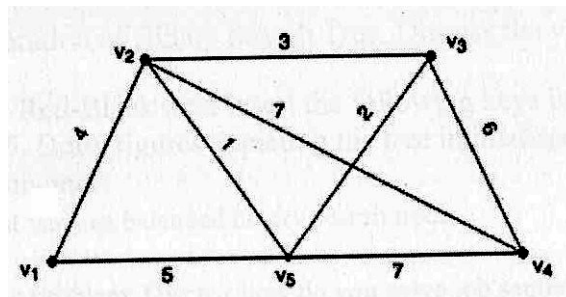
b) Write short notes on following : **6**
   i) Collision Resolution
   ii) Biconnected Graphs.

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