



I SEMESTER M.C.A. MAKEUP EXAMINATION – DEC 2017

SUBJECT: ADVANCED DATA STRUCTURES AND ALGORITHMS [MCA 4102] (REVISED CREDIT SYSTEM)

26-12-2017

Time : 3 hours

Max. Marks : 50

Instructions to Candidates

- 1. Answer ALL questions.
- 2. Missing data may be suitably assumed.
- 1A What do you mean by Breadth First Search of a graph? Write the algorithm to perform Breadth First Search. Using this algorithm, obtain the breadth-first tree for the following graph taking 's' as the source vertex. Show each step.



- 1BSort the list [4, 8, 3, 7, 1, 5, 6, 2] using natural merge sort technique. Explain
each step.3
- 1C What is an algorithm? What are the two criteria used for selecting a good 2 algorithm?

2A	What is a recurrence relation? Write the function to find the sum of elements of an array using recursion and obtain the recurrence relation for the complexity of this function.	5
2B	What are the two methods of representing a 2-D array? Explain with an example.	3
2C	Differentiate between primitive and non-primitive data structures. Give an example for each.	2

3A	Explain the three binary tree traversal techniques and write their algorithms. Write all the three traversal sequences for following tree: $ \begin{array}{c} 2 \\ 7 \\ 5 \\ 11 \\ 4 \end{array} $	5
3B	Differentiate between FIFO and Max-Profit (or Least-Cost) based Branch and Bound strategy.	3
3C	What is a minimum spanning tree? State two differences between Kruskal's and Prim's algorithms for obtaining the minimum spanning tree of a graph.	2

4A	Define the terms min tree and min heap. Construct a min heap for the following set of numbers. Show each step.	5
	20 12 35 15 10 80 30 17 2 1	
4B	Explain, with an example, the closed hashing method of resolving collision during hashing.	3
4C	What do you mean by space complexity of an algorithm? What are its two components? Explain them.	2

5A	Write the solution space tree for the 0/1 Knapsack problem, given $n = 3$, $c = 30$, $w = [20, 15, 15]$ and $p = [40, 25, 25]$. Solve the problem using backtracking method.	5
5B	Explain the adjacency list representation of an unweighted graph. Write the adjacency list for the following graph. $6 + 5 + 1 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3$	3
5C	What is a complete digraph? Give an example.	2