

Reg. No.



**MANIPAL INSTITUTE OF TECHNOLOGY**  
**MANIPAL**  
(A constituent unit of MAHE, Manipal)

**I SEMESTER M.C.A.**  
**MAKEUP EXAMINATION – DECEMBER 2018**

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

26-12-2018

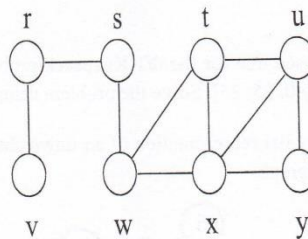
Time : 3 hours

Max. Marks : 50

**Instructions to Candidates**

1. Answer ALL questions.
2. Missing data may be suitably assumed.

- 1A Explain 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. 5

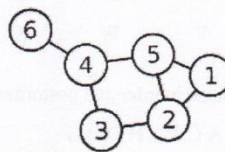


- 1B Construct a binary tree whose inorder and postorder sequences are as follows: 3
- Inorder: E A C K F H D B G  
Postorder: E C K A H B G D F

Write the preorder traversal sequence for the same.

- 1C Define an algorithm. List the two criteria used for selecting a good algorithm. 2

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| 2A | Explain the term 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 | Describe the method of representing a set using a tree. Illustrate with an example.  | 3 |
| 2C | Differentiate between primitive and non-primitive data structures. Give an example for each.   | 2 |
| 3A | Differentiate between infix and prefix forms of a mathematical expression. Write the algorithm to evaluate a prefix expression. Using this algorithm, evaluate the prefix expression $- * + 5 \ 8 \ 3 / 4 \ 2$ . Show each step of evaluation. | 5 |
| 3B | Explain the difference between FIFO and Max-Profit (or Least-Cost) based Branch and Bound strategies.  | 3 |
| 3C | Define 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 a circular queue. Differentiate it from an ordinary queue. Write and explain the algorithms for performing insertion and deletion operations in a circular queue.   | 5 |
| 4B | Explain the meaning of a strongly connected graph. Explain with an example.  | 3 |
| 4C | Describe space complexity of an algorithm. Explain its two components.   | 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.  | 3 |



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| 5C | Write any two advantages of a linked list over an array. | 2 |
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