

**MCA I Year II Semester (R17) Regular Examinations, June - 2018**  
**DATA STRUCTURES**

Time : 3 hours

Max Marks : 60

Answer all **five** units. (5 x 12 = 60 Marks)**UNIT-I**

1. (a) What is the complexity of an algorithm? Explain various notations used to express the complexity of an algorithm?  
(b) Write a recursive procedure to solve towers of Hanoi problem?

OR

2. (a) Explain the classification of data structures with a suitable diagram?  
(b) Define recursion and write a recursive procedure to reverse a N digit number?

**UNIT-II**

3. (a) What is abstract data type (ADT)? Represent stack operations using ADT.  
(b) Write a program to implement the enqueue and deque operations of a queue?

OR

4. (a) Write the procedure for infix to postfix conversion?  
(b) Explain various types of arithmetic expression and evaluate the following postfix expression.  
1 2 3 4 5 6 7 8 9 + - \* + - \* + \*

**UNIT-III**

5. (a) Define double linked list and write a procedure to represent a polynomial expression using double linked list?  
(b) Write a program for the following operations in a single linked list?  
i. Create a single linked list of N nodes.  
ii. Delete a node from the beginning.

OR

6. (a) Write procedures for the following operations in a circular single linked list.  
i. Inserting a node at beginning  
ii. Deleting a node at specified position  
(b) Write a program to implement stack operations PUSH and POP using single linked list?

**UNIT-IV**

7. (a) Construct a complete binary for the numbers from 1 to 27. Write the height and leaf nodes of the constructed tree.  
(b) Construct a binary tree given the pre-order traversal and in-order traversals as follows:  
i) Pre-Order Traversal: G B Q A C K F P D E R H  
ii) In-Order Traversal: Q B K C F A G P E D H R

Continued in page 2

OR

8. (a) Write recursive algorithms for inorder, preorder and postorder binary tree traversal.  
(b) Construct a binary search tree by inserting following nodes in sequence:

68, 85, 23, 38, 44, 80, 30, 108, 26, 5, 92, 60.

Write inorder, preorder and postorder traversal of the above generated Binary search tree.

**UNIT-V**

9. (a) Compare the time complexities of various sorting and searching algorithms?  
(b) Sort the given list of numbers : 12, 67, 89, 21, 75, 31, 99, 86, 17, 51, 32, 59 using quick sort and write the quick sort procedure

OR

10. (a) Write the name of the sorting technique which is used in playing cards game? Write a procedure for sorting a given list of numbers using that technique?

14, 25, 36, 74, 85, 6, 53, 62, 41

- (b) Search a given key 35 from the given list of numbers: 25, 47, 63, 84, 12, 35, 78, 66, 32, 20 using binary search and also write the binary search procedure.

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