MCA/M-16
DATA STRUCTURES
PAPER: MCA-14-24

Time Allowed: 3 Hours                                         Maximum Marks: 80

Note: Attempt five questions in all. Question No. 1 is compulsory. All questions carry equal marks.

**Compulsory Question**

1. (a)  Comment on the need of data structures?

    (b)  How arrays are represented in computer memory?

    (c)  What is priority queue?

    (d)  How dynamic memory is managed in C/C++?

    (e)  What do you mean by threaded binary tree?

    (f)   Discuss significance of B tree.

    (g)  How can you store a graph in computer memory?

    (h)  Write and compare the complexities of various sorting algorithms?

### UNIT-I

2. (a)  What do you mean by complexity of an algorithm? How asymptotic notations can prove to be helpful in finding complexities?

    (b)  How a string can be stored in computer memory? Write and explain an algorithm for pattern matching.

3. (a)  What is a sparse matrix? How it is stored in computer memory? Explain with suitable examples.

    (b)  Write algorithms for inserting and deleting an elements from an array.

### UNIT-II

4. Write an algorithm for inserting and deleting the elements from a one-way linked list an any position.

5.  What do you understand by Polish notations? Write and explain algorithms for converting an infix expression into a postfix expression and evaluating a post expression.


## UNIT-III

6.  (a)   What do you mean by tree traversal? Write and explain algorithm for traversing a binary tree using in order traversal.

    (b)   Write and explain the algorithm for heap-sort.

    5.   What is the need of search trees? Differentiate various search trees on various counts using suitable examples.

## UNIT-IV

8.  (a)   Write and explain BFS algorithm for traversing a graph.

    (b)   What is hashing? Explain various hashing functions.

9.  (a)   Write down a recursive algorithm for binary searching.

    (b)   How insertion sort is performed? Explain.