

Roll No. 180179804

Total Pages : 03

MCA/M-19

10504

DATA STRUCTURES

MCA-14-24

Time : Three Hours]

[Maximum Marks : 80

**Note :** Attempt *Five* questions in all. Q. No. 1 is compulsory. In addition to compulsory question, attempt *four* more questions selecting *one* question from each Unit. All questions carry equal marks.

### Compulsory Question

1. Answer the following questions in brief :
  - (i) Specify an application where you will make use of a two dimensional array.
  - (ii) Describe one application where you will make use of a string and describe one operation on string that you would perform in that application.
  - (iii) What is a priority queue ?
  - (iv) What is the role of linked list in dynamic memory allocation ?
  - (v) Enumerate any *two* important applications of trees.
  - (vi) List the properties of B-trees.
  - (vii) Describe *one* method of representing a graph.
  - (viii) What is the purpose of Hashing.

## Unit I

2. (a) What is the importance of data structures in solving problems ? How are data structures classified ? Give *two* examples of each type to highlight their distinction.
- (b) How is an array stored in memory ? How will an element be inserted in an array ?
3. (a) What is meant by Asymptotic Analysis of an algorithm ? Describe the commonly used asymptotic notations used to represent the complexity of an algorithm.
- (b) Describe the use of pointers and sparse matrices with a description of one application each for both.

## Unit II

4. List the operations that can be performed on a stack. Also describe the linked and array representation of stacks. Illustrate with a suitable example the procedure for evaluating a postfix expression using a stack.
5. Describe the following in the context of linked list :
  - (a) Circular linked list
  - (b) Operations on linked lists
  - (c) Applications of linked list.

### Unit III

6. Define binary tree and show how it can be traversed ? Bring out the distinction between binary tree and threaded binary tree. How will a binary tree be created for the following input ?

10, 15, 12, 7, 8, 18, 6, 20

7. Describe the following types of binary trees along with a description of their construction/representation using appropriate examples :
- (a) Heap
  - (b) Binary search tree
  - (c) AVL tree.

### Unit IV

8. Explain *one* method of finding shortest path between any *two* nodes in a graph. Also explain breadth first traversal of a graph.
9. Given the array :

36, 48, 25, 35, 55, 20, 30, 6

Describe the following sorting techniques and show the contents of the array after each sort listed below :

- (a) Insertion sort (after fourth iteration)
- (b) Selection sort (after fourth iteration).