17/05/2019

Roll No. ..... 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 dintinction 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 iteraction)
   (b) Selection sort (after fourth iteration).