

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

MCA (2012 & Onwards) (Sem.-2)

DATA STRUCTURES

Subject Code : MCA-203

Paper ID : [B0135]

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. **SECTIONS-A, B, C & D contains TWO questions each carrying TWENTY marks each and students has to attempt any ONE question from each SECTION.**
2. **SECTION-E is COMPULSORY consisting of TEN questions carrying TWENTY marks in all.**

SECTION-A

- 1)
 - a) What do you understand by complexity of an algorithm? How rate of growth is shown with the help of Big O notation?
 - b) Transform the following expression into postfix form using stacks :
$$A \ (B * C + (D / E \uparrow F) * G + H$$
- 2)
 - a) What is a linear array? How is it represented in memory? Write an algorithm to delete kth element from the array.
 - b) What is a two way linked list? How to insert an element into a sorted two way linked list?

SECTION-B

- 3)
 - a) Write an algorithm to traverse a tree using preorder traversal.
 - b) What is a binary search tree? How to find the location of an item in a binary search tree? Explain with the help of an example.
- 4)
 - a) What is a heap? Build a heap from the following list of numbers :
46, 35, 60, 16, 70, 55, 80, 60.
 - b) What is a complete binary tree? How is it different from a binary tree? How a binary tree is represented in memory?

SECTION-C

- 5) a) What is a graph? How a simple graph is different from a multigraph and a complete graph? What do you understand by degree of a graph? What is an out degree and an in degree of a node? How a graph is strongly connected?
b) How to traverse a graph using Breadth First Search technique? Write an algorithm for the same.
- 6) a) How a graph is represented in memory? Explain with suitable examples.
b) How to insert an edge in a graph? Explain with the help of an algorithm.

SECTION-D

- 7) a) What is hashing? Why is it required? Discuss any three hash functions with appropriate examples.
b) Write and explain algorithm for sorting a list using radix sort.
- 8) a) How to sort a list of elements using bubble sort? Explain the method and complexity of the method.
b) Write and explain the method of binary search with the help of an algorithm.

SECTION-E

9, Write briefly :

- a) What is time space complexity tradeoff?
- b) How to find the location of an element in a two dimensional array?
- c) What is a circular header linked list?
- d) What is an extended binary tree?
- e) What is an m-way search tree?
- f) What is a path matrix?
- g) What is a directed graph? Give an example.
- h) What is quadratic probing?
- i) Make a decision tree for sorting three items.
- j) How insertion sort is different from selection sort?