

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

- Q1) a) How to evaluate a postfix expression using stacks? Elaborate with the help of an example. (10)
- b) What is a Two-Way Linked List? How to delete an element from a two-way linked list? Give the algorithm. (10)
- Q2) a) Discuss the complexity of an algorithm. What do you understand by time space tradeoff? What is the significance of Big O notation? (10)
- b) What is a Pointer? Discuss pointer arithmetic in detail. How array of pointers are used? (10)

SECTION-B

- Q3) a) What is a Binary Tree? How binary trees are represented in memory? How to traverse a binary tree using pre-order traversal using recursion? (10)
- b) What is a B-tree? How an element is inserted into a B-tree? Explain with the help of an example. (10)
- Q4) a) How to delete an element from an AVL search tree? Give an example. (10)
- b) What is Max Heap? How to delete an element from Max Heap? Write the algorithm. (10)

SECTION-C

- Q5) a) What is a Path Matrix? Write and explain Dijkstra's algorithm to find shortest path in a graph. (10)
- b) How to delete a node from a graph? Write and explain the algorithm with the help of an example. (10)
- Q6) a) How to traverse a graph using Depth First Search (DFS)? Give a non-recursive algorithm of DFS and give an example. (10)
- b) Discuss linked representation of a graph with the help of an example. (06)
- c) What is a Complete Graph? How many edges are there in a complete graph with n nodes? Give an example. (04)

SECTION-D

- Q7) a) How to resolve collision in hashing? Discuss the method with the help of an example. (10)
- b) Write and explain the algorithm to sort an array using merge sort. Discuss the efficiency of the algorithm. (10)
- Q8) a) Sort the following elements using radix sort :
329, 153, 361, 435, 567, 124, 381, 543 (10)
- b) How to search an element in an array using linear search? Write the algorithm and discuss best and worst case complexity of linear search algorithm. (10)

SECTION-E

Q9 **Write briefly :**

- a) What is a Sparse Matrix? Give example.
- b) What do you understand by Garbage Collection?
- c) What is a Grounded Header Linked List?
- d) What is a Priority Queue? Give an example.
- e) Differentiate between Inorder and Postorder traversal of a tree.
- f) Give an example of threaded binary tree.
- g) Differentiate between simple graphs and multigraphs.
- h) Give an example of division method used for hashing.
- i) Draw a decision tree for sorting 3 items.
- j) Give basic difference between Insertion sort and Selection sort.