

231/005

M.C.A. EXAMINATION

May 2000

(Second Semester)

MCA—201

Data Structures and Algorithms

Time : 3 Hours

Maximum Marks : 80

Note : Attempt any *Five* questions in all, selecting at least *two* questions from each Unit. All questions carry equal marks.

Unit I

1. (a) What are the data structures ? Why do we need data structures ? 4
- (b) Differentiate between Trees and Graphs with examples. 4
- (c) Differentiate between Recursion and Iteration. With an example specify the time complexities in both the cases. 4
2. (a) Implement a Stack in a Linked list and write the algorithms for the following :
 - (i) Pushing an element
 - (ii) Popping an element

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(iii) To check whether a stack is empty or not

(iv) To check whether a stack is full or not.

2x4=8

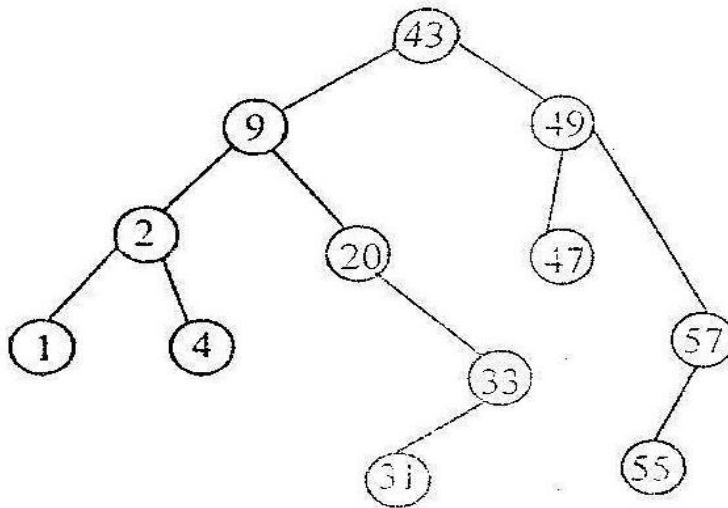
(b) Write an algorithm to implement :

(i) Insertion in a Double Linked list

(ii) Deletion in a Double Linked List.

2x4=8

3. (a) Use the following tree to write the Preorder, Postorder and Inorder Tree Traversal expressions. 6



(b) Show the binary expression tree that represents the following pre-order expression 4

(109)

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$$/++ abc + d-e*f+ gh$$

(c) Insert and Delete an element from a Bi
(Write the Algorithm).

4. Write short notes on the following :

- (i) Top-Down Design of Data Structure
- (ii) Complete and Full Binary Tree
- (iii) Adjacency Matrix and Siblings
- (iv) Digraphs and Dequeues.

Unit 2

5. Find and compare the Time Complexities for

4

- (i) Selection Sort
- (ii) Quick Sort
- (iii) Bubble Sort
- (iv) Merge Sort

6. (a) The following values are to be sorted
Table 25, 42, 96, 101, 102, 1
Use the Division Method of Hashing
Table Size of 7.

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(110)

- (b) Write an algorithm for Binary Searching. Find the Time Complexity as well. 8
- 7 (a) How Heap Sort is better than Quick Sort ? Compare the essential characteristics of the algorithms for the two. 8
- (b) Write advantages and disadvantages of Dynamic Storage Allocation over Static Storage Allocation. 8
- 8 Briefly explain the following terms :
- (i) Rehashing
 - (ii) Buckets and Collision
 - (iii) Merge Sort
 - (iv) Goals for good programs.

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