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MCA – 122

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 1449**

Roll No.

**M. C. A.**

**(SEM. I) EXAMINATION, 2006-07**

**DATA & FILE STRUCTURE USING 'C'**

*Time : 3 Hours]*

*[Total Marks : 100*

- Note :*
- (1) Attempt **all** questions.*
  - (2) All questions carry equal marks.*
  - (3) In case of numerical problems assume data wherever not provided.*
  - (4) Be precise in your answer.*

1. Attempt any **four** parts of the following: **5×4=20**
  - (a) Describe briefly the types of structures used for storing strings.
  - (b) Derive and explain in brief a formula to obtain an address of any element in three dimensional ARRAY stored in row major order.
  - (c) Define the two way linked list. Discuss the advantages of two linked list over the one way linked list in case of deleting a node whose location LOC is given.
  - (d) Suppose a linked list consists some numeric values. Design an algorithm to find maximum value in the list.

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(e) Translate the following infix expressions into postfix notations:-

(i)  $((A+B)*D) \uparrow (E-F)$

(ii)  $A + (((B-C)*(D-E)+F)/G) \uparrow (H-J)$

(f) Define the QUEUE data structure. Write an algorithm to delete and insert an item from the queue and into the QUEUE-

2. Attempt any **four** parts of the following : **5×4=20**

- (a) Write a function / procedure to reverse a linked list so that the last element becomes the first one and second last become the second element and so on.
- (b) Define the binary tree. Draw two binary trees that are similar, and draw two binary trees that are equivalent.
- (c) Define the inorder traversing. Write an algorithm/program for inorder/traversing method.
- (d) What is the graph? Explain the adjacency matrix to represent the directed graph.
- (e) Write an algorithm/program to traverse the graph using the breadth first traversal method.
- (f) What are the threaded binary trees? Explain the one-way and two-way inorder threading.

3. Attempt any **two** parts of the following:-
- (a) How merge sort works ? Explain it with suitable example. On what types of data set the method is suitable; explain in brief.
  - (b) Write the sequential search and binary search algorithm on the data stored in an array. Compare these two methods.
  - (c) What is hashing? Explain various methods to find hash functions. How collision situation can be avoided?
4. Attempt any **two** parts of the following: **10×2=20**
- (a) Define the heap. How a priority queue be implemented using the heap ?
  - (b) What is an AVL tree ? How the insertion and deletion can be performed in the AVL tree ?
  - (c) How the deletion can be performed from a binary search tree ? Write and explain the algorithm.
5. Attempt any **two** parts of the following: **10×2=20**
- (a) Write a recursive and nonrecursive versions of the procedure which calculate the factorial of 'n' numbers. Examine and compare the execution of both in terms of space and time as *n* become larger.

- (b) Write an algorithm for selection sort. Explain how the selection sort is more efficient than bubble sort.
- (c) Write short notes on the following :
- (i) doubly linked list
  - (ii) circular linked list.
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