



Printed Pages : 3

MCA - 202

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

PAPER ID : 1467

Roll No.

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M.C.A.

(SEM. II) EXAMINATION, 2007-08

DATA AND FILE STRUCTURE USING 'C'

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all questions.

1 Attempt any **four** of the following : 5×4=20

- (a) What is recursion? Discuss the Tower of Hanoi problem.
- (b) What is a stack? What are its applications? Reverse a string with the help of a stack.
- (c) Write a function to find transpose of a matrix.
- (d) Write an algorithm to convert infix expression to postfix.
- (e) What will the address of a $\{i,j\}$ element stored in a $\{m,n\}$ matrix if elements are stored in
 - (i) row-major order
 - (ii) column-major order.
- (f) Write a short note on algorithm complexity.



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

- (a) Implement a deque with the help of a linear linked list.
- (b) Implement a queue with the help of a doubly linked list.
- (c) Implement a queue with the help of two stacks.
- (d) (i) What is a linked list? What are its operations and applications? State its advantages over array.
(ii) Write a short note on compaction.
- (e) How two polynomials can be added using linked list? Write an algorithm for it.
- (f) Implement insert and delete operation on circular linked list.

3 Attempt any **two** of the following : 10×2=20

- (a) Describe Huffman algorithm and its application.
- b) Describe hashing and one collision resolving technique.
- (c) What is a binary tree? How is it represented inside the memory? Write an algorithm to delete a node from threaded binary tree.

4 Attempt any **two** of the following : 10×2=20

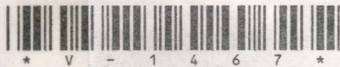
- (a) Explain the way merge sort using an example.
- (b) Implement all the operations on Binary Search Tree (BST).
- (c) What is the difference between internal and external sorting? Compare all the internal sorting algorithms and do their time analysis.



Attempt any **two** of the following :

10×2=20

- (a) Define Graph. What are its applications?
Discuss the various ways of representing Graphs.
- (b) Discuss the sequential and indexed file organization.
- (c) What is hashing? Compare it with indexing.
Describe index file organization in detail.
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M. C. A.

(SEM. II) EXAMINATION, 2006-07

DATA & FILE STRUCTURE USING C

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all questions. All question carry equal marks

1 Attempt any two parts of the following : $10 \times 2 = 20$

- (a) A 'magic square' is square array of integers such that the sum of every row, the sum of every column, and the sum of each of the two diagonals are all equal.

Write a program that reads a square array of integers and determines whether or not it is a magic square.

- (b) Consider the following arithmetic expression P written in postfix notation.

P : 12, 7, 3, -, /, 2, 1, 5, +, *, +

- (i) Translate P, by inspection and hand, into its equivalent infix expression.
- (ii) Evaluate the infix expression.
- (iii) Evaluate the post fix expression P using stack.

- (c) Write down both iterative and recursive version of Binary search algorithm. What is the time-complexity in both cases?

2 Attempt any **two** parts of the following : **10×2=20**

- (a) Write C function to implement queues in a linear array with two indices 'front' and 'rear', such that when rear reaches the end of the array, all the items are moved to the front of the array.
- (b) Write a procedure SORT, which sorts a linked list without changing any values in information field of the nodes.
- (c) Write a function that splits a list into two other lists, so that the entries that were in odd-numbered positions are now in one list (in the same relative order as before) and those from even numbered positions are in the other new list.

3 Attempt any **two** parts of the following : **10×2=20**

- (a) Write functions in C that will
- find height of a linked binary tree
 - copy a linked binary tree.
- (b) Suppose that L1 and L2 are lists containing n_1 and n_2 integers, respectively, and both lists are already sorted into numeric order.

Use the idea of binary search to describe how to find the median of the n_1+n_2 integers in the combined lists.

- (c) Write a C function to retrieve an item from a hash table with open addressing and linear probing.

4 Attempt any **two** parts of the following : **10×2=20**

(a) Write a program in C which sorts a list of n items using insertion sort method.

Illustrate your algorithm with an example.

(b) (i) Write an algorithm to insert an item into a binary search tree.

(ii) Illustrate the execution of HEAP SORT on the array

A = <6,14,3,25,2,10,20,7,6>

(c) Write procedures of Operations:

(i) B-Tree search

(ii) B-Tree Insert.

5 Attempt any **two** parts of the following : **10×2=20**

(a) (i) Explain depth first search traversal algorithm of a graph

(ii) Write a procedure which determines whether or not a graph G is a graph. The graph is maintained in memory by linked representation.

(b) Explain prims algorithm to find the minimum cost spanning tree of a weighted graph. Illustrate your algorithm with an example.

(c) Write short notes on:

(i) B+Tree index files

(ii) Hash Task Implementation

(iii) Recursion

(iv) Threaded Binary Tree.