

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

PAPER ID : 1467

Roll No.

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MCA

SECOND SEMESTER EXAMINATION, 2005-2006

DATA AND FILE STRUCTURE USING C

Time : 3 Hours

Total Marks : 100

- Note :**
- (i) Attempt **ALL** questions.
 - (ii) All questions carry equal marks.
 - (iii) In case of numerical problems assume data wherever not provided.
 - (iv) Be precise in your answer.

1. Attempt *any two* parts of the following : (10x2=20)

- (a) Illustrate, with the help of an example, the use of stack to evaluate an arithmetic expression.
- (b) Consider an $n \times n$ matrix A whose all elements other than those on the major diagonal and on the diagonals immediately above and below this one are zero. If the non-zero elements in the matrix are represented row - wise in an array, B, with A(1, 1) being stored at B(1), obtain an algorithm to determine the value of A(i, j), $1 \leq i, j \leq n$ from the array B.
- (c) Write a C program to compute A by

$$A = (\dots((a_n x + a_{n-1})x + a_{n-2})x + \dots + a_1)x + a_0$$
for a given x (say x_0). Determine the number of additions and multiplications needed to compute A for a given n.

2. Attempt *any two* parts of the following : (10x2=20)

- (a) Write an $O(1)$ algorithm to delete a node X in a singly linked list A . Assume that the node X is not the last node of A .
- (b) How can you represent a polynomial in a linked test? Write an algorithm to add two polynomials represented by linked tests.
- (c) Write a recursive algorithm to check whether two singly linked test are equal or not.

3. Attempt *any two* parts of the following : (10x2=20)

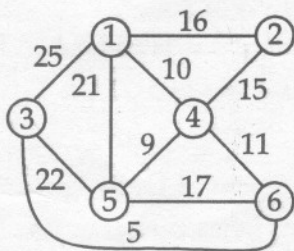
- (a) Define Threaded Binary Tree. Write an algorithm to insert a node in a threaded binary tree.
- (b) Show that every binary tree is uniquely generated by its pre order and inorder sequences.
- (c) Discuss how one can handle overflow in hashing.

4. Attempt *any two* parts of the following : (10x2=20)

- (a) Define Heap. Write an algorithm to sort n elements using heap.
- (b) Use Quicksort algorithm to sort 36, 15, 40, 1, 60, 20, 55, 25, 50, 20. Is it a stable sorting algorithm? Justify.
- (c) Show that external path length of a binary tree is the sum of its internal path length and twice the number of internal nodes.

5. Attempt *any two* parts of the following : (10x2=20)

- (a) Write an algorithm which finds the transitive closure of a graph.
- (b) Use Krnskal's algorithm to determine the minimum spanning tree of the graph given below :



- (c) Define a B-tree of order m . Find the minimum number of index entries in a B-tree of order m with height h .

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