



Printed Pages : 3

CS – 402

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

PAPER ID : 1030

Roll No.

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## B. Tech.

(SEM. IV) EXAMINATION, 2006-07

DATA STRUCTURES USING 'C'

Time : 3 Hours]

[Total Marks : 100

Note : Attempt *all* questions.

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

- (a) Define data, information, algorithm and data structure. Give the difference between linear and nonlinear data structures with example.
- (b) Write a program to input a matrix  $N \times N$  and to determine :
  - (i) the no. of elements in matrix
  - (ii) summation of diagonal elements
  - (iii) product of diagonal elements.
- (c) Define time complexity. Explain Big oh (O) notation.
- (d) Write an algorithm for deleting duplicate numbers from a linear array.
- (e) Write a program which sort a list of strings.
- (f) Write an algorithm for binary search. What are its limitations?

**2** Attempt any **four** parts : **5×4=20**

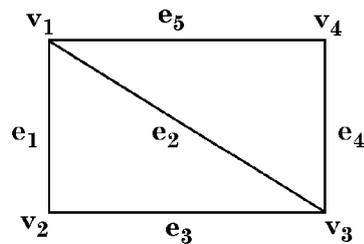
- (a) Write an algorithm for matching different parenthesis such as {, [, ( in an algebraic expression.
- (b) Given the following arithmetic expression in infix notation as  $12/(7-3)+2*(3+8)-7$   
Translate this expression into postfix notation and then evaluate it.
- (c) Write functions to implement recursing versions of pre-order, in-order and post-order transversals of a binary tree.
- (d) Write an algorithm which reverses the order of elements on stack using one additional stack and some additional variables.
- (e) Write algorithm for insertion and deletion on priority queues.
- (f) Write a program to construct and delete elements in a circular queue using link list.

**3** Attempt any **four** parts : **5×4=20**

- (a) Write a short note on Garbage Collection and Compaction.
- (b) Write a program to delete a node in a doubly linked list.
- (c) Write an algorithm for a single linked circular list which reverses the direction of the links.
- (d) Compare the dynamic implementation of a linear linked list.
- (e) Write a program to add two polynomials in single variables.
- (f) Write a procedure to merge two singly linked list whose elements are sorted in ascending order to produce a single singly linked list sorted in ascending order.

4 Attempt any **four** parts : **5×4=20**

- (a) Write a recursive program to compute height of a binary tree.
- (b) Draw the binary search tree that results from inserting into an initially empty tree records with keys given below in order ?  
E, A, S, Y, Q, U, E, S, T, I, O, N and then deleting the Q.
- (c) What is a threaded binary tree ? Explain with the help of example. What are its advantages?
- (d) Find the incidence matrix of the graph.



**Fig. 1**

- (e) Draw all (nonsimilar) trees with exactly six nodes.
- (f) Write an algorithm which counts the number of connected components in a graph.

5 Attempt any **four** parts : **5×4=20**

- (i) Insertion and Deletion in B-Trees
- (ii) Spanning Trees
- (iii) Huffman's Algorithm
- (iv) Merge Sort
- (v) Comparison of Indexing and Hashing
- (vi) Tower of Hanoi Problem