

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

**PAPER ID : 1065**

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

### B. Tech.

(SEM. III) ODD SEMESTER THEORY EXAMINATION  
2010-11

### DATA STRUCTURE USING C

Time : 3 Hours

Total Marks : 100

Note : Attempt all questions.

1. Answer any **two** parts : **(10×2=20)**
  - (a) (i) Consider a three dimensional array X whose subscript limits are :  
$$0 \leq i \leq 10, 0 \leq j \leq 50, 0 \leq k \leq 30.$$
Assume that storage for the array begins at 2000 in memory and 4 bytes are required to hold each element of the array. Compute the actual address of the element X[5, 20, 10] assuming that array is stored in row major order.
  - (ii) Explain the following terms :
    - (A) Time Complexity
    - (B) Sparse Matrix
    - (C) Algorithm
    - (D) Recursion.
- (b) (i) Write an algorithm to convert an infix expression to postfix expression.
- (ii) What is stack ? Give an implementation of stack in 'C' language.

- (c) (i) Explain the Tower of Hanoi problem and write a recursive algorithm to solve it.
- (ii) Write a 'C' program to check whether a given string is palindrome or not.

2. Answer any two parts : (10×2=20)

- (a) Define queue. Formulate insertion and deletion algorithms for a circular queue.
- (b) Write a routine which inserts a given element in a sorted singly linked list at correct position.
- (c) Give a dynamic implementation of singly linked list in 'C' language.

3. Answer any two parts : (10×2=20)

- (a) (i) Define the following :
- (A) Binary Search Tree
  - (B) Complete Binary Tree
  - (C) Depth of a Tree
  - (D) Leaf of a Tree
- (ii) Inorder and Postorder traversal of a tree T is given as follows :
- Inorder : B A E F D C G
- Postorder : E F A B G C D
- Draw the Tree T.
- (b) What do you mean by threaded binary tree ? Write a function to traverse a threaded binary tree in postorder.
- (c) (i) Describe Huffman algorithm with the help of suitable examples.

(ii) Write a 'C' program to search an element in a sorted set of integers using binary search algorithm.

4. Answer any two parts : (10×2=20)

(a) Write an algorithm for sorting a set of positive integers in ascending order using Quick Sort procedure. Give worst case and average case time complexity of the algorithm.

Illustrate this procedure for following keys :

50, 78, 8, 11, 3, 95, 65, 36.

(b) Write an algorithm for insertion in a Binary Search Tree. Show the Binary Search Tree built from a sequence of insertions for the following sequence of keys :

8, 17, 10, 15, 5, 2, 16, 19, 13, 1, 4.

(c) Define AVL tree. Starting with an empty tree, build the AVL tree by following sequence of insertions :

D, J, A, M, J, O, F, N.

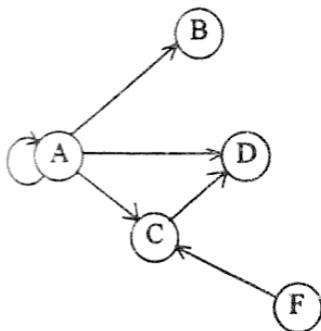
Also label the rotations according to their types.

5. Answer any two parts : (10×2=20)

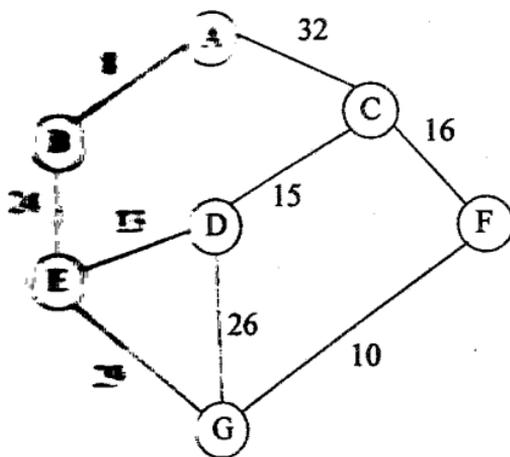
(a) (i) For the given graph :

(A) Find its adjacency matrix.

(B) Find its path matrix using adjacency matrix.



- (ii) Obtain ~~the minimum~~ cost spanning tree using ~~Kruskal's algorithm~~ for the given graph.



- (b) Write ~~an algorithm~~ to determine the number of connected components in a given graph.
- (c) Write ~~short note~~ on File organization.