(b) (i) Write and explain Dijkstra's algorith for finding shortest path.

(ii) Write and explain DFS graph traversal algorithm.

(c) What is a Graph ? Describe various types of graph. Briefly explain few applications of graph.

5. Describe any **two** parts of the following : **(10×2=20)**

(a) What is B Tree ? Describe the method to delete an item from B tree.

(b) (i) Sort the following array manually using non recursive quick sort method :

40, 15, 65, 35, 55, 45, 75, 95, 85, 05 and 30.

(ii) Write the conditions when collision occurs in hashing. Describe any collision detection algorithm in brief.

(c) Draw an AVL tree on following inputs, assume that tree is initially empty :

45, 55, 65, 75, 80, 90, 100, 110, 120, 130, 40, 35, 25, 20, 15, 10, 5.

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

PAPER ID : 0110 **Roll No.**

B.Tech.

(SEM. III) ODD SEMESTER THEORY EXAMINATION 2013-14

DATA STRUCTURES USING C

Time : 3 Hours *Total Marks : 100*

Note :– (i) Attempt **all** questions.

(ii) All questions carry equal marks.

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

(a) Explain the upper triangular and lower triangular sparse matrices. Suggest an space efficient representation for space matrices and determine the address determination formulas for it.

(b) Write an algorithm to create two way linked lists. Write algorithm to insert and delete the node from specified location.

(c) Explain the method to represent polynomial using link list. Write and explain the algorithm to add two univariate polynomials using link lists.

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

(a) Write an algorithm that reserves order of all the elements in a singly linked list.

(b) Write a recursive algorithm for solving the problem of Tower of Hanoi and also explain its complexity. Illustrate the solution for four disks and three pegs.

(c) (i) Consider the following arithmetic expression written in infix notation :

$E = (A + B) * C + D/ (B + A * C) + D$.

$E = A/B \wedge C + D * E - A * C$

convert the above expression into postfix and prefix notation.

(ii) Write an algorithm to convert a postfix expression to infix expression.

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

(a) What is Threaded Binary Tree (TBT) ? Write algorithm/ function inorder to traversal of threaded binary tree.

(b) Find the original tree from the following given traversal order :

(i) Inorder : EACKFHDBG

Preorder : FAEKCDHGB

(ii) Preorder : GBQACKFPDERH

Inorder : QBKCFAGPEDHR

(iii) Inorder : MEPAQTRCFK

Postorder : MPEQRCTKFA.

(c) (i) Show that the maximum number of nodes in a binary tree of height h is $[2^{h+1} - 1]$. A binary tree of height h with the maximum number of nodes is called a full binary tree and Show that the minimum height of a binary tree with n nodes is $[\log_2 (n+1) - 1]$.

(ii) Write an algorithm to insert an element in Binary Search Tree (BST).

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

(a) What is Spanning Tree ? Describe Kruskal and Prim's algorithm to find the minimum cost spanning tree and explain the complexity. Determine the minimum cost spanning tree for the graph given below :