Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III • EXAMINATION – SUMMER 2013

Subject Code: 130702 **Date: 04-06-2013**

Subject Name: Data and File Structure

Time: 02.30 pm - 05.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Define sparse matrix. Briefly explain representation of sparse matrix with the help of link list and array. **07**

(b) Define data structure. Briefly explain linear and non linear data structures with their applications **07**

Q.2 **(a)** Convert following infix expressions to the postfix expressions. Shows stack trace. **07**

A/B$C+D*E/F-G+H

(A+B)*D+E/(F+G*D)+C

(b) Write an algorithm for stack operations Push, Pop and Empty. Assume stack is implemented using array **07**

OR

(b) What is the advantage of postfix expression over infix expression? Write an algorithm of postfix expression evaluation. **07**

Q.3 **(a)** Write a C function **search (l, x)** that accepts a pointer l to a list of integers and returns a pointer to a node containing x if it exists and the null pointer otherwise. **07**

(b) Write **insert** and **remove** functions for queue if it is implemented using circular link list. **07**

OR

Q.3 **(a)** Briefly explain advantages of doubly link list over singly link list. Write function **delete (p, &x)** which delete the node pointed by p in doubly link list. **07**

(b) Briefly explain advantages of binary search tree. Construct binary search tree for the following elements **07**

8,3,11,5,9,12,13,4,6,20

Q.4 **(a)** The inorder and preorder traversal of a binary tree are **07**

d b e a f c g

a b d e c f g respectively

Construct binary tree and find its postorder traversal.

(b) Define Directed graph, spanning tree and minimum spanning tree. Find minimum spanning tree for the graph shown in Figure 1. **07**

OR

Q.4 **(a)** Answer the following

1. The height of a binary tree is the maximum number of edges in any root to leaf path. Define the maximum number of nodes in a binary tree of height h. **01**

2. Consider a B-tree in which the maximum number of keys in a node is

5. What is the minimum number of keys in any non-root node? **01**

3. Define threaded binary tree. What are the advantages of threaded binary tree? Give example of threaded binary tree. **05**

(b) The Breadth First Search algorithm has been implemented using the queue data structure. Find breadth first search for the graph shown in Figure 2 with starting node M **07**

Q.5 **(a)** The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function h(k) = k mod 10 and linear probing. What is the resultant hash table? **07**

(b) Define AVL tree. Construct AVL tree for following data **07**
10,20,30,40,50,60,70,80

OR

Q.5 **(a)** What are the advantages of Multi way search tree over binary search tree? Construct 2-3 tree for the following data **07**
12, 50, 85, 6, 10, 37, 100, 120, 25, 70

(b) Define following **07**

1. Strictly binary tree
2. Index sequential search
3. Hashing

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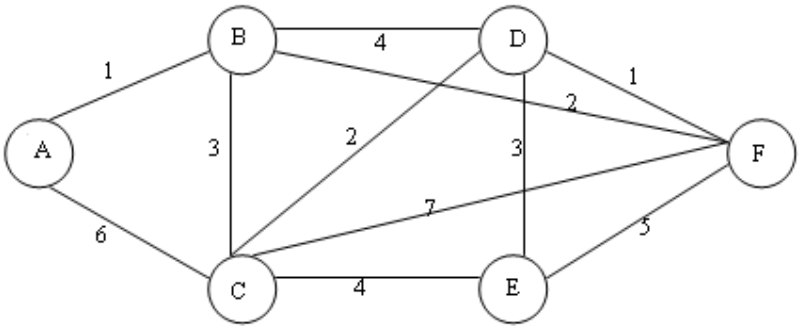

Figure 1

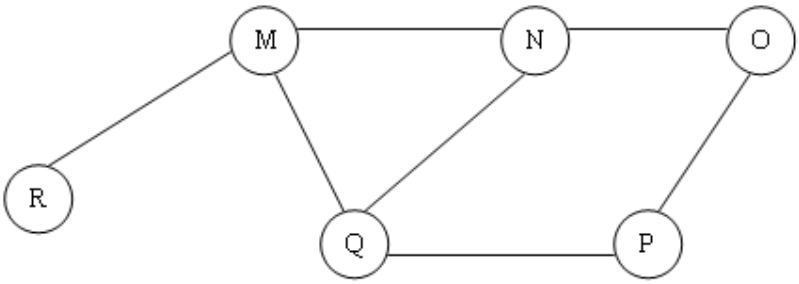

Figure 2