

**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 **01**
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.

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  $h(k) = k \text{ mod } 10$  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? **07**  
 Construct 2-3 tree for the following data  
 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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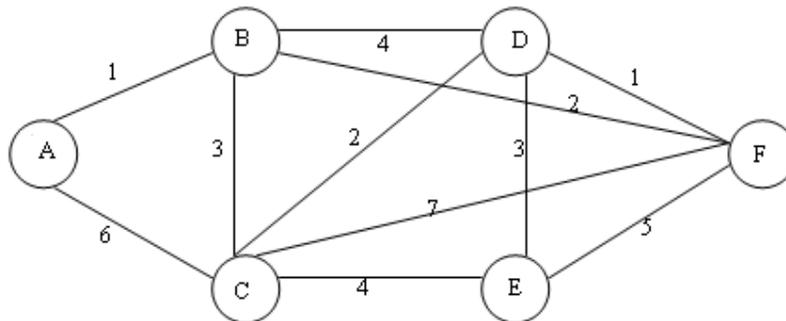


Figure 1

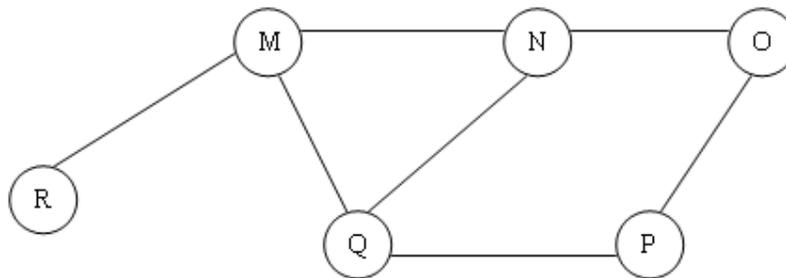


Figure 2