

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE SEM-III Examination May 2012****Subject code: 130702****Subject Name: Data and File Structure****Date: 15/05/2012****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)** What is data structure? Explain linear and non-linear data structure with example. **03**

**(b)** Define Time complexity and Space complexity. Calculate time complexity for given expression. **04**

```

for (k=0; k<n; k++)
{
    rows[k] = 0;
    for(j=0; j<n; j++)
    {
        rows[k] = rows[k] + matrix[k][j];
        total = total + matrix[k][j];
    }
}

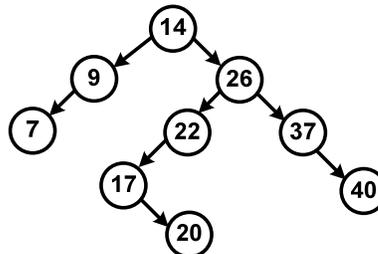
```

**(c)** Write a non-recursive algorithm for Preorder traversal of a binary tree. **07**

**Q.2 (a)** Do as directed. **07**

(1) What are the applications of the stack?

(2) First insert 10 and then insert 24. After these insertions, delete 37 and then delete 22 from the following binary search tree. Draw the tree after each operation.



**(b)** Answer the following questions. **07**

(1) Given a two dimensional array Z1(2:9, 9:18) stored in column-major order with base address 100 and size of each element is 4 bytes, find address of the element Z1(4, 12).

(2) Write a short note on Weight balanced tree.

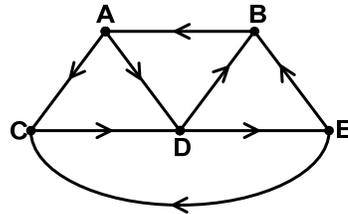
**OR**

**(b)** Answer the following questions. **07**

(1) Explain insertion operation in the 2-3 tree: (i) if the parent has 2 children and (ii) if the parent has 3 children.

(2) Write a short note on Index sequential file organization.

- Q.3 (a)** What is Tower of Hanoi? Explain it with  $n=3$ . **04**
- (b)** Write an algorithm to convert infix expression into postfix expression with parenthesis. **05**
- (c)** Obtain the adjacency matrix  $A$  for the following graph. Find  $A^2$ . Find outdegree of  $E$  and  $D$  nodes. **05**



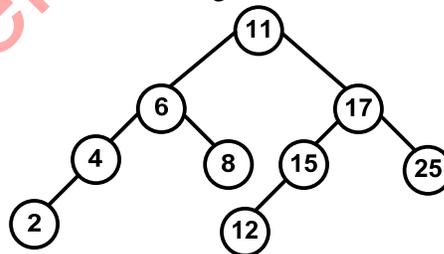
**OR**

- Q.3 (a)** What is sparse matrix? Explain memory representation of sparse matrix. **04**
- (b)** Differentiate between stack & queue. Also explain priority queue. **05**
- (c)** Write a short note on Threaded binary tree. **05**

- Q.4 (a)** Write an algorithm for circular queue that insert an element at *rear* end. **04**
- (b)** Write a short on Breadth First Search and Depth First Search in graph. **05**
- (c)** Explain the basic two techniques for Collision-resolution in Hashing with example. Also explain primary clustering. **05**

**OR**

- Q.4 (a)** Write an algorithm for Double Ended Queue that insert an element at *front* end. **04**
- (b)** Write a short note on Spanning tree. **05**
- (c)** Insert 1, 29, 32 and 13 in the following Height balanced tree. For each insertion, draw the balanced tree using AVL rotation. **05**



- Q.5 (a)** Write an algorithm for inserting and deleting an element into circular linked list. **07**
- (b)** Explain terms: (1) Path (2) Graph **04**
- (c)** Evaluate following prefix expression. **03**  
 $+*AB-C+C*BA$  ( $A=4, B=8, C=12$ )

**OR**

- Q.5 (a)** Write an algorithm to insert a new node into orderly doubly linked list. **07**
- (b)** Explain terms: (1) Cycle (2) Complete binary tree **04**
- (c)** Write difference between singly linked list and doubly linked list. **03**

\*\*\*\*\*