Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–III EXAMINATION – SUMMER 2016**

**Subject Code:130702** **Date:09/06/2016**

**Subject Name:Data and File Structure**

**Time:10:30 AM to 01:00 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)** | Give various applications of stack and queue. | **06** |
| | **(b)** | What is a binary search tree? Explain with an example and state its applications. Also explain deletion in a binary search tree. | **05** |
| | **(c)** | Discuss the advantages and disadvantages of linked list over array. | **03** |
| **Q.2** | **(a)** | Write a 'C' program to implement a stack. Do check for overflow and underflow. | **07** |
| | **(b)** | What is hashing? Explain the collision resolution techniques. | **07** |
| | | **OR** | |
| | **(b)** | Define recursion. What care should be taken in writing recursive function? Give a recursive solution for the problem of "Towers of Hanoi". | **07** |
| **Q.3** | **(a)** | Consider a circular queue of size 6.<br>Let Front =2, Rear =4, and Queue : __, L, M, N, __, __<br>Describe the queue as following operations are performed.<br>1) Add O<br>2) Add P<br>3) Delete<br>4) Delete<br>5) Add Q, R, S<br>6) Delete | **07** |
| | **(b)** | What is importance of postfix notation? Write the algorithm for converting an infix expression to postfix notation. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Convert the following expression to postfix notation. Show the contents of the stack while conversion.<br>12 / (7 - 3) + 2 * (1 + 5) | **07** |
| | **(b)** | What is a priority queue? Discuss the array implementation of priority queue. | **07** |
| **Q.4** | **(a)** | Write an algorithm to insert a node before a given node in a singly linked list. Is it advantageous to use a doubly linked list for this operation? Explain. | **07** |
| | **(b)** | Create a B-tree of order 5 by inserting the following data values.<br>D, H, K, Z, B, P, Q, E, A, S, W, T, C, L, N, Y, M | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | What is an AVL tree? Explain the different types of rotations used to create an AVL tree with suitable examples. | **07** |
| | **(b)** | Construct an expression tree for the following expression.<br>A+(B+C*D+E)+F/G.<br>Make a preorder traversal of the resultant tree. | **07** |

**Q.5** **(a)** A binary tree T has 9 nodes. The inorder and preorder traversals of T give the following sequence of nodes. **07**

Inorder: E A C K F H D B G

Preorder: F A E K C D H G B

Draw the tree T.

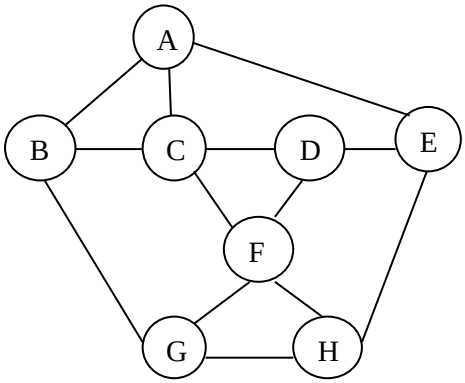
**(b)** What is a graph? Discuss the Adjacency Matrix and Adjacency List representation of graphs with an example. **07**

**OR**

**Q.5** **(a)** Define the following with respect to a graph: **07**

1) Path 2) degree 3) Cycle 4) Spanning tree 5) Directed Graph

**(b)** Consider the following graph: Create a minimum spanning tree using the Kruskal's algorithm. **07**




**********