

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**MCA - SEMESTER- II - EXAMINATION – WINTER 2015**

**Subject Code: 620001**

**Date:30/11/2015**

**Subject Name: Data Structures**

**Time:02.30 p.m. To 05.00 p.m.**

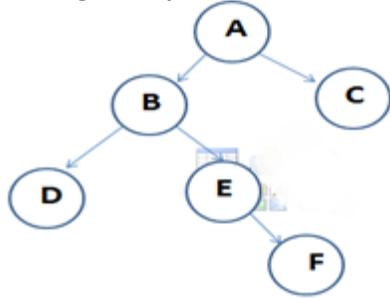
**Total Marks: 70**

**Instructions:**

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

- Q. 1** Do as directed. **[14]**
- (1) Define Big O notation of time complexity.
  - (2) Define stack and top.
  - (3) Write applications of graph.
  - (4) Define: Leaf node and Degree.
  - (5) Discuss hash function with suitable example.
  - (6) Differentiate AVL and B Tree.
  - (7) Define inorder threaded tree.
- Q. 2** **A** Discuss algorithm efficiency of selection sort with best, worst and average case. **[07]**
- B** 1) Array[-2:7] is array of integer with row major array. Calculate total memory occupied by it. Also find address of [-1,4]<sup>th</sup> element. Assume the base address is 100. **[04]**
- 2) Explain sparse matrix and its array representation. **[03]**
- OR**
- A** Explain basic idea of two way merge sort. Show tracing for the following data **[07]**  
25, 15, 40, 60, 18, 28, 16, 70, 30
- B** 1) Write algorithm to delete first node from single link list. **[04]**
- 2) List various types of queue and write its applications. **[03]**
- Q. 3** **A** Explain binary search technique with suitable examples. How this technique is better than sequential search technique? Explain how this technique is used to create binary search tree. **[07]**
- B** 1) Explain push and pop operation for stack with algorithms. Also explain overflow and underflow situations. **[04]**
- 2) Write algorithm for insertion operation into circular queue with handling of overflow situation. **[03]**
- OR**
- A** Define heap. Demonstrate construction of min heap after insertion of each of the following values : 25, 33, 23, 30, 35, 24 **[07]**
- B** 1) Write algorithm to insert node at front end of single link list. **[04]**
- 2) Write algorithm for traversing of double link list in reverse direction. **[03]**

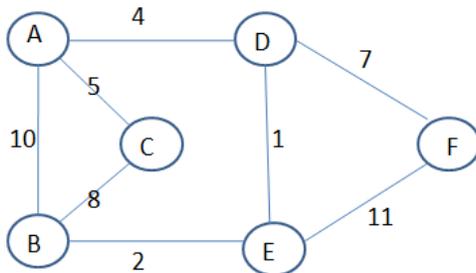
- Q. 4** **A** List various traversing methods for **binary search tree**. Write recursive algorithm to traverse Binary search tree in inorder. Give inorder and preorder traversal of following binary tree. [07]



- B** Write algorithm to calculate path matrix from given adjacency matrix. Define minimum spanning tree and spanning tree. Discuss any one method of finding minimum spanning tree. [07]

**OR**

- A** Show tracing for creation of minimum spanning tree for following graph using Krushkal's algorithm. [07]



- B** Show tracing for conversion of following infix expression to suffix expression using stack.  $(a+b)*(c-d)/e$  [07]

- Q. 5** **A** Define the characteristics of B-tree. Demonstrate construction of B-tree of order 3 by inserting each of the following data: 12, 15, 7, 10, 18, 25, 14, 11, 18, 26, 20, 15, 22, 4 and 19 [07]

- B** Explain m – ary tree, trie structure and hash table with suitable examples. [07]

**OR**

- A** Show all passes of quick sort for ascending order sorting of following data: 33, 49, 89, 15, 29, 16, 41, 18. Also write rules of partition for the sorting. [07]

- B** What do you mean by collision? List various techniques of collision resolutions. Discuss any one in detail. [07]