

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.

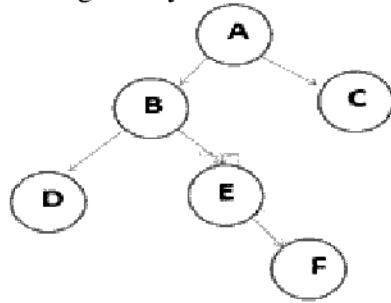
Total Marks: 70

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]th 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]

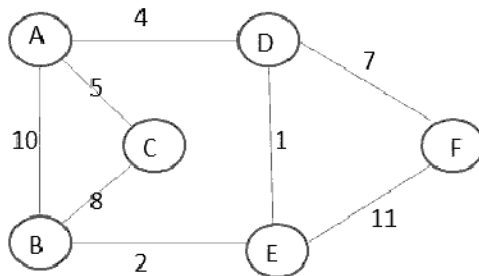
- Q.4 A** List various traversing methods for **binary search tree**. Write recursive algorithm to traverse Binary search tree in inorder. Give inorder and preorder traversal of following binary tree. [07]



- 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]