

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER-II • EXAMINATION – WINTER • 2014

Subject Code: 2620001

Date: 28-11-2014

Subject Name: Data Structures

Time: 02:30 pm - 05:00 pm

Total Marks: 70

Instructions:

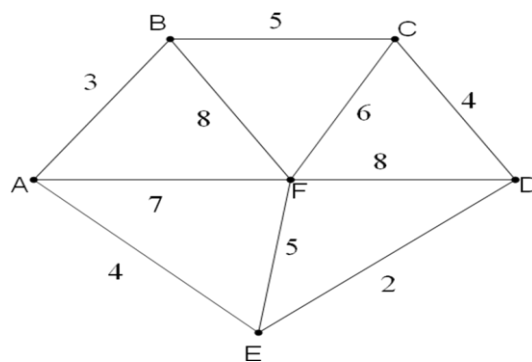
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Answer the following. **07**
1. Define primitive data structure.
 2. What is asymptotic notation?
 3. What is KWIC indexing?
 4. Write applications of graph data structure.
 5. Define sparse matrix.
 6. Define time complexity and space complexity.
 7. Differentiate complete binary tree and full binary tree.
- (b)** Explain stack. List applications of stack. Write an algorithm for PUSH, POP, PEEP and CHANGE operation on stack using array representation. **07**
- Q.2 (a)** Write an algorithm to convert parenthesized infix expression to reverse polish expression. Convert the following infix expression to corresponding reverse polish expression: **07**
- $(A+B \uparrow C \uparrow D) * (E+F/D)$
- Give the trace of the steps including stack content and rank in tabular form.
- (b)** Construct an AVL tree by inserting the following elements in the given order. **07**
- 15, 20, 24, 10, 13, 7, 30, 36, 25
- By applying appropriate rotation.
- OR**
- (b)** Define singly linked list. Write an algorithm to implement following operation in singly linked list. **07**
1. Insert the node at the beginning of linked list.
 2. Insert the node at the end of linked list.
- Q.3 (a)** List the limitation of simple queue. What is circular queue? Write an algorithm for insert and delete operation in circular queue using array representation. **07**
- (b)** Explain how polynomial can be represented in singly linked list. Write an algorithm to perform addition of two polynomials. **07**
- OR**
- Q.3 (a)** Explain binary search tree? Create binary search tree for the following elements: **07**
- [50, 25, 75, 22, 40, 60, 80, 90, 15, 30]
- Showing the structure after each insertion. Also give its inorder, preorder and postorder traversal.
- (b)** Explain Queue data structure. Why it is known as FIFO? Write an algorithm for insertion and deletion operation on simple queue using array representation. **07**

- Q.4 (a)** Describe briefly circular linked list and a typical node structure used for it. Write an algorithm to delete a node from a singly linked list, where the list is an ordered list. The node to be deleted may be in the beginning of the list or may be at the end of the list or somewhere in the middle of the list. Consider all the situation. **07**
- (b)** What are the characteristics of a B-tree? Construct a B-tree of order 3 from the following data: 10, 20, 30, 40, 50, 60, 70, 80 and 90. **07**
Showing the structure after each insertion.

OR

- Q.4 (a)** Define heap tree. Explain types of heap tree. Demonstrate creation of min heap tree for the following set of data: [65, 80, 45, 70, 95] **07**
- (b)** State the different sorting and searching techniques you have studied. Explain the merge sort with suitable example. **07**
- Q.5 (a)** What is minimal spanning tree? Give difference between spanning tree and minimal spanning tree. Apply prim's algorithm for the following graph and construct minimal spanning tree. **07**



(Show separate diagram for each stage).

- (b)** Demonstrate Quick sort on the following set of data : **07**
[42, 23, 74, 11, 65, 58, 94, 36, 99, 87]
Take the first number as pivot.

OR

- Q.5 (a)** Explain hash function and collision resolution techniques with suitable examples. **07**
- (b)** For what purpose the Breadth First Search (BFS) and the Depth First Search (DFS) are used? Explain the BFS and DFS searching procedure with an example. **07**
