Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA INTEGRATED – SEMESTER –III EXAMINATION – WINTER - 2016

Subject Code:4430602 **Date:21/11/ 2016**

Subject Name: Data Structures

Time:10:30 am To 1:00 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)** Do as directed: **07**

1. Define : Topological sort
2. Define : Collision
3. Write full form of KWIC.
4. In any binary tree, Maximum number of nodes on level l is _____.
5. Draw the trie structure for the following sequence:
   aa, aab
6. State the following condition is true or false:
   $O(n^2) > O(n \log n)$
7. Difference between linear search and Binary search.

(b) Define data structure. Explain different types of data structures. **07**

Q.2 **(a)** Write an algorithm for conversion of given infix expression into postfix expression using stack. **07**

(b) Write an algorithm for (i) Inserting a given element at the rear of a Circular Queue, and for (ii) Deleting and returning the last element from a Circular Queue. **07**

OR

(b) 1) What is sparse matrix? Represent it using Multilist. **04**

2) Briefly explain cursor implementation. **03**

Q.3 **(a)** Write an algorithm for adding two polynomials. Algorithm should take the two polynomials as input and return the resultant polynomial. **07**

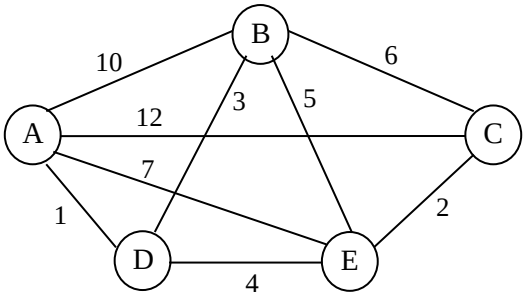
(b) Write an algorithm for Radix Sort. **07**

OR

Q.3 **(a)** Demonstrate Quick Sort on the following set of numbers. **07**

55, 16, 53, 31, 98, 12, 79, 82, 63, 77

(b) Explain the Prim's algorithm using following figure: **07**



Q.4 **(a)** Define binary tree. What are the traversals in binary tree? Explain each traversal with an example. **07**

(b) Draw AVL tree by inserting the following elements one by one: **07**

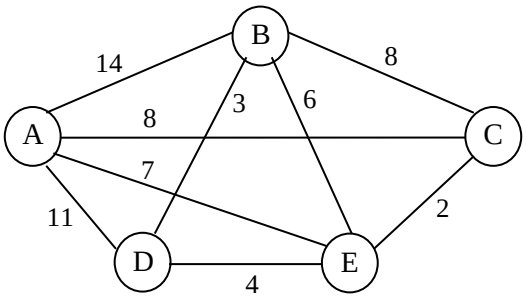
7, 13, 27, 9, 11, 14, 8, 37, 24

OR

Q.4 **(a)** Illustrate inserting an element into a Min heap with the following numbers: 2, 3, 81, 62, 1, 20, 35, 15, 9, 48. **07**

(b) What are the characteristics of a 2-3 tree? Make 2-3 tree for the following list of elements : 22, 29, 8, 34, 17, 89, 11, 19 **07**

Q.5 **(a)** Explain the Dijkstra's algorithm using following figure(Starting vertex A). **07**



(b) What is hashing function? Explain the following hashing methods **07**

A) Folding Method
B) Division Method
C) Midsquare Method

OR

Q.5 **(a)** Write DFS algorithm and explain it with suitable example. **07**

(b) Consider a hash table of size = 10. Using linear probing, insert the keys 72, 27, 36, 24, 63, 81 and 101 into the table [Formula: H(K) = K (mod h) where h=7]. **07**

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