Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER– III• EXAMINATION – WINTER 2015

Subject Code: 4430602 **Date:03/12/ 2015**

Subject Name: Data 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)** Define following terms : **07**

1. Queue
2. Linear data structure
3. Ordered tree
4. Directed graph
5. Cycle graph
6. Connected graph
7. Parallel graph

(b) Do as directed : **07**

1. Draw expression tree of given expression : A * B / C + D – E / F * G
2. Which algorithms are used to find out shortest path?
3. What is level order binary tree traversal?
4. A node without any child node are called
   (a) Internal node
   (b) Leaf node
   (c) Root node
   (d) None of the above
5. List out asymptotic notations.
6. A matrix containing a large number of zero values as compared to the non – zero values is called a _____ matrix.
7. When a binary search tree is traversed in _____, it results in the sequence of elements in ascending order.

Q.2 **(a)** Define following according to algorithm: **07**

1. Algorithm
2. Time complexity
3. Space complexity
4. Best case
5. Worst case
6. Asymptotic notations
7. RAM model

(b) Explain Tower of Hanoi problem by moving 3 discs. **07**

OR

(b) Convert the following Infix expression to the corresponding Postfix expression: **07**

A * B / C + D – E / F * G

Give the trace of the steps including Stack Contents and Rank in tabular form.

Q.3 **(a)**

1. Write a note on KWIC indexing. **03**
2. Write an algorithm to delete an element from simple queue. **04**

(b) Write an algorithm to add two polynomials using singly linked list. **07**

OR

Q.3 **(a)** Generate binary tree whose in-order and pre-order are as follows. Also find post-order traversal. **07**

Pre-order : M G D J I K R P V T Y

In-order : D G I J K M P R T V Y

(b)
1. How to convert general tree into binary tree? Explain with suitable e.g. **03**
2. Explain 2 – 3 tree in detail with e.g. **04**

Q.4 **(a)** Write an algorithm for quick sort & sort the following data using quick sort. **07**

10, 23,64,21, 74, 95, 2, 59,44,87, 55

(b)
1. Write algorithm of binary search. **03**
2. Explain representations of sparse matrix using proper e.g. **04**

OR

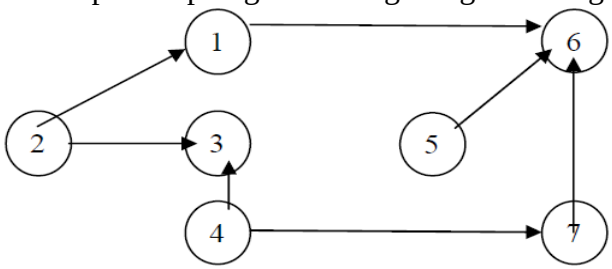
Q.4 **(a)** Sort the following data using heap sort. **07**

20,65,43,53,78,10,78,40,39,29

(b) Generate AVL tree by using following elements : **07**

11, 12, 13, 14, 15, 16, 17

Q.5 **(a)**
1. Explain topological sorting using following graph : **04**



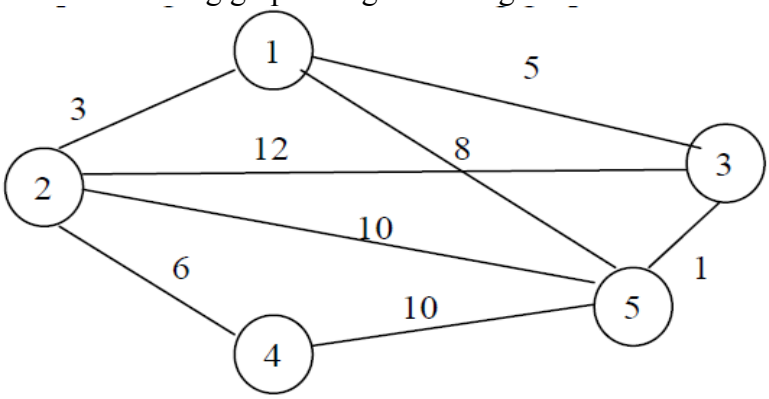
2. Give differences between BFS and DFS. **03**

(b) What is head in threaded binary tree? Explain threaded binary tree with proper e.g. **07**

OR

Q.5 **(a)** Consider a hash table of size = 8. Using linear probing, insert the keys 11, 12, 13, 14, 1, 15, 16, 17. **07**

(b) Find minimum cost of following graph using Prim's algorithm. **07**



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