



DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B.TECH. SEMESTER IV [INFORMATION TECHNOLOGY]
SUBJECT: (IT-406) DATA STRUCTURE & ALGORITHMS

Examination : block (REPEATER) **Seat No.** : _____
Date : 6/4/ 2018 **Day** : Friday
Time : 3:00 – 4:15 **Max. Marks** : 36

INSTRUCTIONS:

1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed.

- (a) If G is an directed graph with 20 vertices, _____ boolean values will be needed to represent G using an adjacency matrix? And _____ adjacency lists would be needed for G ? [1]
- (b) Which data structure is used to perform recursion? [1]
- (c) Quick sort is also known as _____. [1]
[merge sort/ tree sort/shell sort/ partition and exchange sort]
- (d) What is the difference between linear and non-linear data structure? [2]
- (e) Suppose our aim is to sort an array in ascending order. Which of the following statements is true? [2]
- 1) Input in ascending order is worst case for both selection sort and insertion sort.
 - 2) Input in descending order is worst case for both selection sort and insertion sort.
 - 3) Input in ascending order is worst case for insertion sort but not for selection sort.
 - 4) Input in descending order is worst case for selection sort but not for insertion sort.
- (f) Which of the following statement is false ,with reference to singly linked list ?WHY? [2]
- 1). Arrays are dense lists and static data structure.
 - 2) Data elements in linked list need not be stored in adjacent space in memory
 - 3) Next Pointers are used to store the next “data” element of a list.
 - 4) Linked lists are collection of the nodes that contain information part and next pointer.
- (g) Construct expression tree for the following postfix expression: [3]
 $A B + C - D E + F * -$

Q.2 Attempt *Any Two* from the following questions. [12]

- (a) Write the merge sort algorithm,using iterative approach. Trace your algorithm on the following data: “ 60, 30, 10,40, 20,70,10,50 ”. Note-clearly show **all** passes [6]
- (b) Draw the weighted graph that corresponds to adjacency matrix given in figure 1: [6]
- | | A | B | C |
|---|----------|----------|----|
| A | 0 | 10 | 20 |
| B | 10 | 0 | 2 |
| C | ∞ | ∞ | 0 |
- Figure-1**
- Now show give a breadth first search based technique for finding shortest path from “A” to all other vertices.
- (c) Give ADT to store uni variate polynomial using linked list. Your ADT should provide functions for 1) Subtract two polynomials 2) display contents of polynomial 3) copy one polynomial into other. Give detailed functions. [6]

Q.3 (a) Make a BST for the following sequence of numbers. [6]
45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48
Traverse the tree in Preorder, Inorder and Postorder.

- (b) What are circular queues? Write down routines for inserting and deleting elements from a circular queue implemented using arrays. [6]

OR

Q.3 (a) Write down algorithm/Code to insert right child in threaded binary tree [6]

- (b) Construct a 2-3-4 search tree by inserting the following elements in the order of their occurrence: [6]
70, 30, 90, 50, 5, 95, 10, 40, 80, 7, 75, 85, 60, 35