Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER–II • EXAMINATION – WINTER • 2014

Subject Code: 620001 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)** Define: asymptotic analysis. List notations used for it. **02**

(b) List any four application of data structure in computer science. **02**

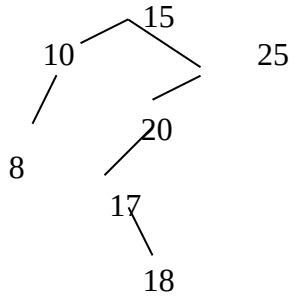
(c) Compare array VS linked list with specialized features. **02**

(d) "Shell sort is not suitable for linked list" comment on this statement. **02**

(e) What is sparse matrix? List sparse matrix representation. **02**

(f) Explain garbage collection in brief. **02**

(g) Explain whether following tree is height balanced or note? **02**



Q.2 **(a)** 1. What is time complexity? Explain with example how to calculate time complexity of an algorithm. **04**

2. Give the difference between DFS and BFS. **03**

(b) What is doubly linked list? Write procedure to insert and delete an element from doubly linked list. **07**

OR

(b) What is circular linked list? Write an algorithm to insert and delete an element from the circularly linked list. **07**

Q.3 **(a)** 1. Convert the following infix expression into postfix and prefix notation: A-B/C*D+E*F **04**

2. Write short note on KWIC indexing. **03**

(b) Write short note on sequential representations of binary tree and general tree. **07**

OR

Q.3 **(a)** 1. Explain storage structure for two dimensional array. **04**

2. What is recursion? What are advantages and disadvantages of it? **03**

(b) Write an algorithm to delete a node from a binary search tree. **07**

Q.4 **(a)** Show the tree after inserting 11, 8, 2, 20, 17, 14, 26, 22, 25 into empty Binary Search Tree, Delete 20 and redraw tree, explain with tracing. **07**

(b) Sort 11, 4, 2, 20, 15, 14, 21, 1, and 44 using quick sort. Mention your key element and show content of array after each pass. **07**

OR

Q.4 **(a)** Construct the expression tree for (a+b*c)+((d*e+f)*g) state the result with preorder ,in-order and post order traversal of tree. **07**

(b) What is shell short? Sort 22, 35, 17, 11, 28, 12, 15, 40, 91, 58, 13 using shell sort with increment sequence of your choice, show all steps. **07**

Q.5 **(a)** What is 2-3 Trees? Give the structure of Leaf Nodes and Non-leaf Nodes used in 2-3 tree, also Create 2-3 trees for the values 2,4,7,10,12,15,20,30. **07**

(b) Write algorithm for open addressing random probing method. Write down its average length of search. **07**

OR

Q.5 **(a)** What is B-Tree? Write characteristics of B-Tree. Insert following data into B-tree of order 2: 1 2 3 4 5 6 7. **07**

(b) Using collision resolution with linear probe, obtain the hash table for the following set of keys. Table size is 11. **07**

The name PAY and RATE are mapped into 1
The name TAX is mapped to 2
The name PENSION is mapped into 4
The name DEDUCT, STATUS, DEPENDENTS, SEX and SALARIED are mapped into 11.

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