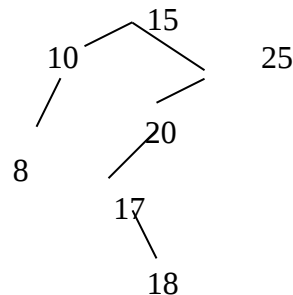


GUJARAT TECHNOLOGICAL UNIVERSITY**MCA - SEMESTER-II • EXAMINATION – WINTER • 2014****Subject Code: 620001****Date: 28-11-2014****Subject Name: Data Structures****Time: 02:30 pm - 05:00 pm****Total Marks: 70****Instructions:**

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 not? | 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 sort? 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.
