Enroll. No._____

MARWADI UNIVERSITY

Faculty of TECHNOLOGY

COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY

[B.TECH.] SEM: 3 WINTER:2018

Subject: - Data Structure (01CE0301) **Date:- 29/10/2018**

Total Marks:-100 **Time: - 03:00 hours**

Instructions:

1. **All Questions are Compulsory.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Question: 1. (a) Answer below the given MCQs [10]

1. push() and pop() functions are found in

   A: queues B : lists C: stacks D: trees

2. Match the following

(1) Tree	(A) Huffman tree
(2) Weighted balanced tree	(B) Acyclic Graph
(3) Queues	(C) Front/ Rear

   A: 1 → A, 2 → B, 3 → C

   B: 1 → B, 2 → C, 3 → A

   C: 1 → A, 2 → C, 3 → B

   D: 1 → B, 2 → A, 3 → C

3. Index of arrays in C programming language starts from

   A: 0 B : 1 C: Either 0 or 1 D: Undefined

4. Recursion uses more memory space than iteration because

   A: It uses stack instead of queue.

   B: Every recursive call has to be stored

   C: Both A & B are true

   D: None of the above are true

5. Which of the following algorithm does not divide the list

   A: Linear Search B : Binary Search C: Merge Sort D: Quick Sort

6. Which of the following is the non-linear data structure?

   A: Trees B : Stacks C: Strings D: None of these

7. _____ is the not the operation that can be performed on queue.

   A: Insertion B : Retrieval C: Deletion D: Traversal

8. The goal of hashing is to produce a search that takes

   A: $O(n)$ B : $O(1)$ C: $O(\log n)$ D: $O(n^2)$

9. The address field in the last node of single link list

   A: null B : next node C: can be A or B D:None of these

10. The data structure required for Depth First Traversal on a graph is

    A: Queue B : Stack C: Array D: None of these

(b) Define the following [10]

I. Priority Queue
II. Double Ended Queue
III. Binary tree
IV. B Tree
V. Height Balanced Tree

Question: 2.

(a) Define data structure. List the various linear and non-linear data structures and explain them in brief [08]

(b) Write an algorithm for binary search in an array and give its real application examples. [08]

OR

(b) Write an algorithm for sequential search in an array and give its real application examples. [08]

Question: 3.

(a) Write an algorithm for insertion and deletion operation in Stack [08]

(b) Convert the following infix expression to postfix expression (reverse polish) [04]

(A/(B-C+D))*(E-A)*C

(c) Evaluate the following postfix expression by assuming A=6, B=2, C=3, D=3, E=6 [04]

AB/C-DE*AC*-+

OR

(a) Write an algorithm for insertion and deletion operation in Queue [08]

(b) Consider the following circular queue having 6 memory cells, where **FRONT=1**, and **REAR=4**

Queue: _, A, C, D, B, _

Describe queue status along with the values of FRONT and REAR after performing each of the following operations: [04]

F is added to the queue
E is added to the queue
Two letters are deleted

(c) Write recursive algorithm for computing factorial. Which data structure can be used to implement this algorithm? [04]

Question: 4.

(a) Write an algorithm to perform following operations in Singly Linked List. [08]

Add a node with value Y in the beginning
Delete a node which contains value X

(b) Discuss Advantages and disadvantages of link list over arrays [04]

(c) Why we use header node in the link list? Write the importance of header node. [04]

OR

(a) State the advantages of circular and doubly linked lists over a singly linked list. [08]

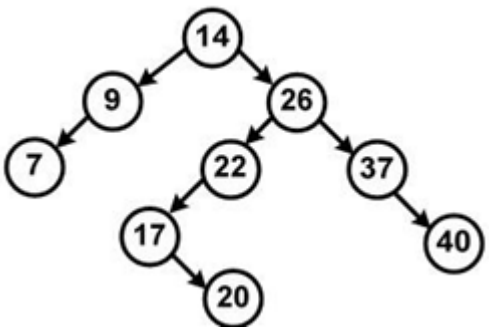
(b) Write an algorithm to perform following operations in Doubly Linked List. Add a node with value X at end also highlight the traversal of link list. [04]

(c) Define B tees and their need. What is the significant of m in B trees. [04]

Question: 5.

(a) In the given Binary Search Tree(BST), perform the following operations:

- Insert 10
- Insert 33
- Delete 26
- Delete 14
- Delete 17
- Insert 35
- Insert 21
- Delete 33



[08]

Draw the tree after each operation.

(b) Explain the need of binary search tree over the binary tree. Also explain any two binary tree traversal technique with example. [04]

(c) Explain the concept of circular queue. Compare circular queue with simple queue. [04]

OR

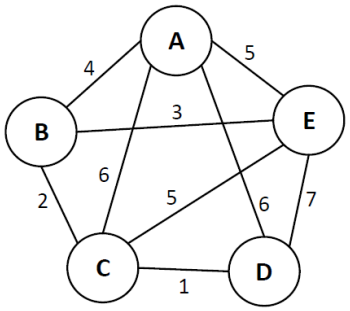
(a) Construct an AVL tree by inserting one value at a time in the following sequence. 150, 155, 160, 115, 110, 140, 120, 145, 130, 147, 170, 180, 181,183,182, 184. Show all the steps [08]

(b) Differentiate between Breadth First and Depth First graph traversal techniques and explain their usage. [04]

(c) Define hashing. Discuss in brief the different ways to resolve collisions in hashing, with suitable examples [04]

Question: 6.

(a) Define **minimum spanning tree (MST)** with example. Find the minimum spanning tree of the graph shown using Prim's Algorithm.



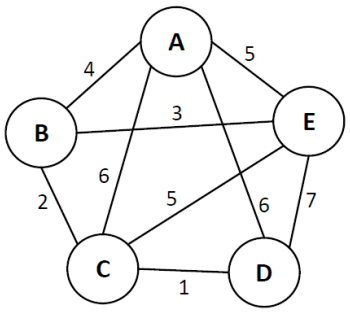
[08]

(b) Write an algorithm to perform Bubble Sort. [04]

(c) Write an algorithm or pseudo code for the Binary Search. [04]

OR

(a) Define **minimum spanning tree**. Find the minimum spanning tree of the graph shown using Kruskal's Algorithm



[08]

(b) Solve example using Merge sort 7, 2, 9, 1, 4, 3, 8, 6, 5 [04]

(c) Write an algorithm or Pseudo code for the Linear Search. [04]

---Best of Luck---

Que. Paper weight-age as per Bloom's Taxonomy

No.	Que. Level	% of weight-age	
		% of weight -age	Que. No.
1	Remember/Knowledge	30	1(b), 2(a), 4(b), 6(c), 6(b)
2	Understand	22	1(a), 5(a), 5(c)
3	Apply	20	2(b), 3(a), 6(b)
4	Analyze	16	4(a), 4(c), 5(b)
5	Evaluate	8	3(b), 3(c)
6	Higher order Thinking	8	6(a)

GRAPH: