

**MARWADI UNIVERSITY****Faculty of Technology**

CE/CE-AI/IT

SEM: 3<sup>rd</sup>**MU FINAL EXAM**

B.Tech

**DECEMBER:2022****Subject: - Data Structure (01CE1301)****Date:- 20/12/2022****Total Marks:-100****Time: - 02:00 to 05:00 PM****Instructions:**

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

**Question: 1****(a). Answer the Following MCQs. (All Questions are Mandatory)****[10]**

1. Which of the following is not a linear data structure?
  - a. Stack
  - b. Linked List
  - c. Queue
  - d. Tree
2. DFS uses
  - a. Stack
  - b. Queue
  - c. Stack and Queue
  - d. None of these
3. Number of edges in null graph is
  - a. 1
  - b. More than 1
  - c. 0
  - d. None of these
4. Sparse matrices have \_\_\_\_\_
  - a. No zero
  - b. Higher Dimensions
  - c. Many zeros
  - d. All Zero
5. The operation of processing each element in the list is known as \_\_\_\_\_
  - a. Sorting
  - b. Merging
  - c. Inserting
  - d. Traversal
6. Which of the following does not store NULL in pointer field of any of its nodes?
  - a. Singly Linked List
  - b. Doubly Linked List
  - c. Circular Linked List
  - d. All of the above
7. Which of the following data structure allows operations at only one end?
  - a. Stack
  - b. Stack and Queue
  - c. Queue
  - d. None of the above
8. Which type of traversal of binary search tree outputs the value in sorted order?
  - a. Pre-Order
  - b. Post-Order
  - c. Random-Order
  - d. In-Order
9. Which of the following is true for Binary Search?
  - a. All the elements should be in sorted order.
  - b. Elements should be arranged in random order.
  - c. Select the pivot element for the searching.
  - d. Array should be empty.
10. A Binary Tree can have
  - a. Can have 1 children
  - b. Can have 2 children
  - c. Can have 0 children
  - d. All of the above

**(b). Answer the Following Questions in One Line. (All Questions are Mandatory)****[10]**

1. Define Data Structure.

2. What is Linear Data Structure?
3. What is Multigraph?
4. What do you mean by Isolated node?
5. Application of binary tree. (Any 2)
6. Define Out-degree.
7. What is Balanced Binary Tree?
8. Write a C structure of binary tree.
9. Define Collision.
10. What is the hash function used in the division method?

**Question: 2.**

- (a) Enlist the different Data Structure types and explain Linear and Non-Linear Data Structure in brief with example. [8]
- (b) What is Binary Search Tree? Create Binary Search Tree for given data. (Show each step) [8]  
K, M, P, G, H, D, Z, O, L, B, F, R
- OR**
- (b) Create the AVL tree from the given data. (Show each step) [8]  
50, 40, 30, 10, 45, 8  
After create a tree, delete 45 and delete 50.

**Question: 3.**

- (a) Write an algorithm for circular singly linked list: [8]  
1. Insert a node at last  
2. Insert a node before given node. (Assume that node is x)
- (b) Convert the given infix expression into post fix. (Using Stack) [4]  
 $(a + b) - (c * d / e) + f * (g \wedge h)$
- (c) A[10][5], Base Address=2000, number of words per memory location = 2, Compute the address of element, A[7,4]. Assume, the elements are stored in RMO. [4]
- OR**
- (a) Write an algorithm for circular singly linked list: [8]  
1. Insert a node at first  
2. Insert a node after given node. (Assume that node value is x)
- (b) Convert the given infix expression into post fix. (Using Stack) [4]  
 $(1 - 2 + 3) * 4 / 5 + (6 \wedge 7)$
- (c) A[10][10], Base Address=1000, number of words per memory location = 2, Compute the address of element, A[7,5]. Assume, the elements are stored in CMO. [4]

**Question: 4.**

- (a) Write an algorithm for Doubly Linked List: [8]  
1. Insert a node after given node value. (Assume that node value is val)  
2. Insert a node at last.
- (b) Draw the Binary Search Tree by using the given value. (Show each step) [8]  
55, 34, 85, 20, 65, 94, 70, 17, 10, 80, 44, 30, 69  
Write the Inorder, Preorder and Postorder
- OR**
- (a) Write an algorithm for Doubly Linked List: [8]  
1. Deleted first node  
2. Delete a node before given node. (Assume that node value is val)
- (b) Draw the Binary Tree using given order. [8]  
In-Order: 4, 10, 12, 15, 18, 22, 24, 25, 31, 35, 44, 50, 66, 70, 90  
Post-Order: 4, 12, 10, 18, 24, 22, 15, 31, 44, 35, 66, 90, 70, 50, 25

**Question: 5.**

- (a) Write an algorithm to insert and delete operation for Circular queue. Also explain the overflow and underflow conditions. [6]
- (b) Write an algorithm of bubble sort. And apply the algorithm on given data with each step. [6]  
5, 3, 1, 9, 8, 2, 4, 7
- (c) Discuss Variations of queues. [4]

**OR**

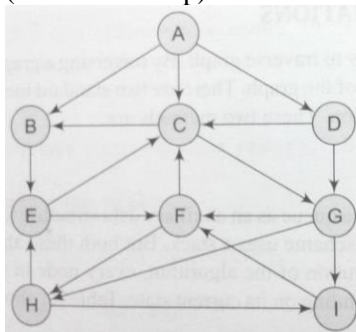
- (a) Write an algorithm to insert and delete operation for simple queue. Also explain the overflow and underflow conditions. [6]
- (b) Write an algorithm for binary search. And apply the algorithm on given data. (Show each step of solution). [6]  
Elements: 2, 5, 10, 15, 20, 25, 30, 35, 40, 42, 50, 52, 66, 70, 80  
Search key: 25
- (c) Write down the application of Stack. (Minimum 4) [4]

**Question: 6.**

- (a) Create AVL tree and show each step. [8]  
10, 20, 30, 40, 50, 60, 70
- (b) Write down an algorithm for quick Sort. [4]
- (c) Discuss Hashing and explain any 2 hashing method. [4]

**OR**

- (a) Create B-tree of order 5 for given data and show each step. [8]  
1, 7, 6, 2, 11, 5, 10, 13, 12, 20, 16, 24, 3, 4, 18, 19, 14, 25
- (b) Write down the sequence of given graph using BFS also display the data in queue format. (Show each step) [4]



- (c) Discuss in brief the different ways to resolve collisions in hashing. [4]

**---Best of Luck---**

## – Bloom's Taxonomy Report –

**Sub: Data Structure (01CE1301)****Sem.: 3<sup>rd</sup>****Branch: Computer Engineering / Information Technology / AI****Que. Paper weightage as per Bloom's Taxonomy**

| LEVEL                           | % of weightage | Question No.  | Marks of Que. |
|---------------------------------|----------------|---|---------------|
| Remember/Knowledge              | 20%            | Q-1 (a), Q-1(b)   | 20            |
| Understand                      | 12%            | Q-2 (a), Q-5(c), Q-5 (c-or)   | 12            |
| Apply                           | 28%            | Q-2(b), Q-2 (b-or), Q-4(b), Q-4 (b-or), Q-3(b), Q-3 (b-or), Q-6(a), Q-6 (a-or), | 28            |
| Analyze                         | 26%            | Q-3(a), Q-3 (a-or), Q-5(a), Q-5 (a-or), Q-4(a), Q-4 (a-or), Q-6(b), Q-6 (b-or)  | 26            |
| Evaluate                        | 14%            | Q-3(c), Q-3 (c-or), Q-5(b), Q-5 (b-or), Q-6(c), Q-6 (c-or)                      | 14            |
| Higher order Thinking/ Creative | -              | -   | -             |

**Chart/Graph of Bloom's Taxonomy**