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**Supplementary Examination EVEN Semester-2024**

**Paper Name: Introduction to Data Structure**

**Paper Code: BCA 201**

**Time: 2.5 Hours**

**Maximum Marks: 60**

***Note: Mobile Phones or programmable calculator or any equipment with memory are not allowed inside the examination hall.***

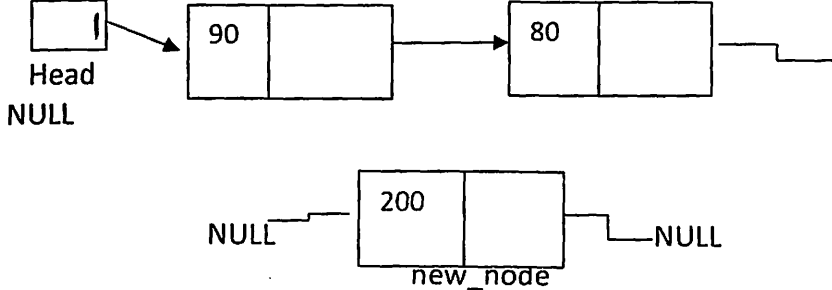
**SECTION: A (20 Marks)**  
***True or False***

***All questions are compulsory (20x1=20)***

| S.No | Questions                                                                                             | Marks | CO  | BL |
|------|-------------------------------------------------------------------------------------------------------|-------|-----|----|
| 1.   | The height of a binary tree is used to calculate its balance factor.                                  | 1     | CO1 | L1 |
| 2.   | Queue follows the First In First Out (FIFO) principle.                                                | 1     | CO1 | L2 |
| 3.   | A graph is a Linear Data Structure.                                                                   | 1     | CO1 | L1 |
| 4.   | Insertion sort has a worst-case time complexity of $O(n^2)$ .                                         | 1     | CO2 | L3 |
| 5.   | A singly linked list node contains pointers to both the previous and next nodes.                      | 1     | CO1 | L1 |
| 6.   | A stack is categorized as a Non-linear Data Structure.                                                | 1     | CO3 | L1 |
| 7.   | Recursion must always include a base case to avoid infinite loops.                                    | 1     | CO1 | L1 |
| 8.   | A heap organizes data using parent-child relationships and is categorized into Min-Heap and Max-Heap. | 1     | CO3 | L2 |
| 9.   | The primary purpose of bucket sort is to reduce the number of comparisons.                            | 1     | CO2 | L1 |
| 10.  | Breadth-first traversal explores all neighbors of a node before moving deeper into the graph.         | 1     | CO3 | L2 |
| 11.  | A cycle in a graph involves repeated vertices, excluding the first and last.                          | 1     | CO4 | L1 |
| 12.  | Binary search is effective only on sorted data.                                                       | 1     | CO3 | L1 |
| 13.  | Bubble sort's best-case time complexity occurs when the list is already sorted.                       | 1     | CO4 | L2 |
| 14.  | A stack is often used for Depth-First Search (DFS) traversal of a graph.                              | 1     | CO3 | L3 |
| 15.  | Operating systems use queues to handle job scheduling and interrupts.                                 | 1     | CO1 | L1 |
| 16.  | A doubly linked list allows traversal in both forward and backward directions.                        | 1     | CO4 | L1 |
| 17.  | The process of converting a general tree into a binary tree is called tree transformation.            | 1     | CO4 | L2 |
| 18.  | Graph traversal methods include Depth-First Search (DFS) and Breadth-First Search (BFS).              | 1     | CO4 | L1 |
| 19.  | Splay trees self-adjust to keep frequently accessed elements near the root.                           | 1     | CO4 | L1 |
| 20.  | A data structure is a way to store data.                                                              | 1     | CO1 | L2 |

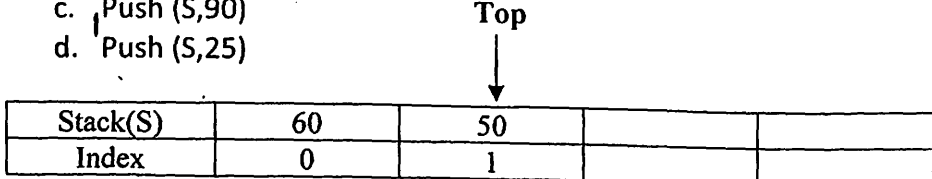
### SECTION-B (4x5=20 Marks)

Attempt any **FOUR** Questions.

|    |                                                                                                                                                                             |   |     |    |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----|----|
| 1. | Write a C program to implement Bubble Sort and perform Bubble Sort on the following data: 12, 103, 17, 101, 60, 200                                                         | 5 | Co4 | L3 |
| 2. | Write a C program to insert new node (new_node) at the Beginning of the LinkedList<br><br> | 5 | Co4 | L4 |
| 3. | Explain the concept of Bucket Sort problem. Apply Bucket sort on the following data 121,40,221,80,107,189,135,100,204,129                                                   | 5 | Co3 | L3 |
| 4. | Differentiate between LinkedList and Array (5 points)                                                                                                                       | 5 | Co2 | L2 |
| 5. | Differentiate between Linear and Non-Linear data structure. (5 points)                                                                                                      | 5 | Co3 | L1 |
| 6. | Write a program for Merge Sort algorithm and perform Merge Sort on the following dataset [ 12, 8, 9, 3, 11, 5, 4]                                                           | 5 | Co4 | L4 |

### SECTION-C (2x10=20 Marks)

Attempt any **TWO** Questions.

|    |                                                                                                                                                                                                                                                                                                                                                     |    |     |    |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|----|
| 1. | Generate the traversal (Inorder, Preorder & Postorder) of the following tree. 8,10,40,2,50,75,6,110,45                                                                                                                                                                                                                                              | 10 | Co5 | L3 |
| 2. | Write a C program to implement Quick Sort and perform Quick Sort on the following data: 16, 33, 28, 50, 21, 70, 40, 11.                                                                                                                                                                                                                             | 10 | Co4 | L2 |
| 3. | Differentiate between Linear and Non-Linear data structure. (5 points)                                                                                                                                                                                                                                                                              | 10 | Co2 | L2 |
| 4. | Explain the concept of stack in data structure & Write a program in C to perform push () and pop() operations in the stack (S) and perform the following operations in the stack.<br>a. Pop (S,20)<br>b. Pop (S,80)<br>c. Push (S,90)<br>d. Push (S,25)<br><br> | 10 | Co4 | L3 |

BL- Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4- Analyzing, 5- Creating)