

END SEMESTER EXAMINATION - APRIL 2026**SEMESTER 2 : INTEGRATED M.Sc. PROGRAMME COMPUTER SCIENCE-DATA SCIENCE****COURSE : 21UP2CRMCP05 : DATA STRUCTURE USING C++***(For Regular 2025 Admission /Improvement and supplementary 2024/2023/2022/ 2021 Admissions)*

Time : Three Hours

Max. Weightage: 30

PART A**Answer any 8**

1. Write the expression in C++ to statically initialize a 2D array.
2. Define the data structure - priority queue.
3. With respect to time and space, define the complexity of a merge sort algorithm.
4. Define the complexity of binary search algorithm.
5. List any two applications of a linked list.
6. Define a circular linked list.
7. Consider the expression P: 12, 7, 3, -, /, 2, 1, 5, +, *, +. Find the value of the expression P, by inspection by hand.
8. Mention any two real-life / computing applications of a queue.
9. Name the operator that is used for dynamic memory allocation in C++
10. The NEXT / LINK part of a node in a linked list contains -----.

(1 x 8 = 8 Weight)**PART B****Answer any 6**

11. State any two drawbacks of implementing stack using array.
12. If a string has a value 'PEOPLE', illustrate each pass, on how selection sort works with the string.
13. Write a C++ code to display each character in a string, with a space in between each character.
14. Give a brief idea about doubly linked list.
15. Discuss the situation when underflow occurs in a stack.
16. Write the syntax and example of allocating memory for an integer variable in C++ at runtime.
17. Discuss the operations that can be performed on a stack.
18. Correct the following module to make the program count the number of nodes in a list:

```
count_nodes() {
    int count=0;
    if(start == NULL)
        cout <<"List is Empty";
    else{
        node *ptr = start->next;
        while(ptr->next != NULL){
            ptr = ptr->next;
            count ++;
        }
    }
}
```

(2 x 6 = 12 Weight)

PART C
Answer any 2

19. With an algorithm, write a C++ program to sort a list of numbers using insertion sort.
20. Create a class STACK with data members - stack[50], and top; Member functions - push(), and display(). Write a C++ program to implement the same.
21. Write a program to create a linked list, search for a node and traverse the entire list.
22. Convert the expression: $A + (B * C - (D / E - F) * G) * H$ into postfix form showing the stack status after scanning each symbol.

(5 x 2 = 10 Weight)