Reg. No ..... Name **24U224**

END SEMESTER EXAMINATION - MARCH 2024

SEMESTER 2 - INTEGRATED M.Sc. PROGRAMME COMPUTER SCIENCE

COURSE : **21UP2CRMCP05: DATA STRUCTURE USING C++**

(For Regular - 2023 Admission and Improvement / Supplementary – 2022/2021 Admissions)

Time : Three Hours Max.Weightage: 30

PART A

Answer any 8 Questions

1. Define the data type - `enum`.
2. _____ is a pointer to the initial location of the array.
3. Define the average case complexity of bubble sort algorithm.
4. Define the complexity of binary search algorithm.
5. Consider the expression P: 12, 7, 3, -, /, 2, 1, 5, +, *, +. Find the value of the expression P, by inspection by hand.
6. Define the data structure - stack.
7. With the queue pointers - front and rear, write the situation for an underflow.
8. List any two disadvantages of a linked list.
9. The _____ node points to the first node in the linked list.
10. The time complexity for inserting into a singly-linked list is _____.

(1 x 8 = 8 Weight)

PART B

Answer any 6 Questions

11. Memory for various program elements can be allocated during compile-time or at runtime. With an example, explain how both these methods differ.
12. A 2D array is defined as [0..7, 2..3] requires 2 bytes of storage space for each element. If the array is stored in row-major form, then calculate the address of element at location [6,2]. Given that the base address of the array is 100.
13. If the follwing numbers are stored in an array, illustrate how bubble sort works on each iteration:
    32, 51, 27, 85, 66, 23, 13, 57
14. Write the algorithm to remove an element from a queue.
15. Discuss the operations that can be performed on a stack.
16. Discuss the situation when underflow occurs in a stack.
17. Write the algorithm to insert a new node at the beginning of a linked list.
18. Give a brief idea about doubly linked list.

(2 x 6 = 12 Weight)

PART C

Answer any 2 Questions

19. Write an algorithm that uses divide-and-conquer approach to sort an array. Implement the same in C++.
20. Write a C++ program to implement a queue using array. Use ordinary functions to implement the functionalities to create a queue, insert into it and display the queue.

21. Write a C++ program to create a stack using array. Use ordinary functions to implement functionalities to create the stack, delete an element from the stack, and to traverse it.
22. Write an algorithm to create a doubly linked list and traverse the list.

(5 x 2 = 10 Weight)