

INTERNATIONAL CENTRE FOR APPLIED SCIENCES MAHE, MANIPAL B.Sc. (Applied Sciences) in Engg. End – Semester Theory Examinations – May 2021 III SEMESTER – DATA STRUCTURES [ICS 231] - Repeaters (Branch: CSE)

Time: 3 Hours	Date: 27 May 2021	Max. Marks: 100
✓ Answer any FIVE FI	ULL questions.	

✓ Missing data, if any, may be suitably assumed or calculated

1A. Write algorithm to convert an infix expression to postfix notation and trace that algorithm to convert the following infix expression to postfix expression. (12)

A - (B / C + (D % E * F) / G) * H

1B. What is Big Oh notation ? Derive the average case time complexity for recursive factorial function and present it in terms of Big Oh notation. (8)

2A. Differentiate between iterative and recursive approach of programming (Any three points). Write a recursive C++ function for binary search and calculate the time complexity. (10)

2B. What is a function template? Define a function template for larger() function of two arguments , instantiate the template with integer, float and string data in the main(). (10)

3. In a hospital, Covid-19 patients list is managed and provided them with the facility at the hospital. To provide the facility a doubly linked priority queue is managed, taking waiting time as the priority. Insert patients in the queue as per the ascending waiting time. Once they are allotted the facilities, they are removed from the queue. Patient's information: name and age is recorded.

This application performs: insertion in the queue, display patients details, removal of patient from the queue once he/she assigned the facility.

Write a complete C++ program to simulate the above situation using priority queue. Demonstrate enum data type. (20)

Patient's Type	Waiting time
Emergency	0
Symptotic	1 Day
Asymptotic	1 Week

4A. Write a complete C++ program to find intersection of two sets of doubly linked lists. Program creates two sets, intersect and display the resultant set. (12)

4B. Define push() and pop() function for single linked stack. Assume that all necessary functions and classes have been defined. (8)

5. Given a list of numbers 22, 7, 6, 1, 60, 11, 77, 59, 19, 20, 17. Show each phase of creating a Binary search tree using them, starting from 22. Describe all three cases of deletion from the binary search tree taking resultant binary search tree into consideration. (20)

6A. Write the Quick Sort function. Trace the function for the values: 45, 15, 27, 60, 14, 90. (10)

6B. What are the advantages of circular queue over ordinary queue? Write Complete C++ code to demonstrate functionality of circular queue. (10)

7A. Considering above binary search tree, manually shown with arrow path, traverse the tree and write the path of traversal for the following techniques: (12)

- i) Inorder
- ii) Preorder
- iii) Postorder

7B. Write a recursive C++ function to check whether two trees are equal or not by returning true or false. (8)

8A. Sort the following list of numbers using Heap Sort algorithm. Show the intermediate steps. (12)

65, 70, 75, 80, 85, 60, 55, 50, 45

8B. Give the recursive function for Tower of Hanoi Problem. Show the working of this function when no. of disks=3. (8)
