

INTERNATIONAL CENTRE FOR APPLIED SCIENCES MAHE, MANIPAL B.Sc. (Applied Sciences) in Engg. End – Semester Theory Examinations – Nov./ Dec. 2020 III SEMESTER - DATA STRUCTURES (ICS 231) (Branch: CS)

Time: 3 Hours	Date: 23 November 2020	Max. Marks: 50
✓ Answer ALL the	questions.	
✓ Missing data, if a	nny, may be suitably assumed	

- 1A. What is a Recursion? List the advantages and disadvantages of Recursion (any two points). Write a recursive C++ function to solve problem of Tower of Hanoi with n discs.
- 1B. What is Big Oh notation ? Derive the average case time complexity for recursive binary search and present it in terms of Big Oh notation.

(5M+5M)

2A. Write algorithm to convert an infix expression to postfix notation and trace that algorithm to convert the following infix expression to postfix expression.

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

2B. Describe advantages of function template. Which situation it is necessary to override the function template by an actual function? Explain with the help of an example code.

(5M+5M)

3. When there are number of vehicles queued on a Highway during a traffic jam, certain vehicles are given priority over other to give way. The possible type of vehicles on road are listed below. When a vehicle arrives, vehicle priority(an integer) is read and inserted into the traffic queue in the order of arrival. When the traffic is to be cleared, a vehicle with highest priority is allowed to move first and the vehicles following it in the queue move forward by one position. Write a complete C++ program to simulate the above situation using priority queue. Demonstrate enum data type.

Vehicle Type	Priority
Emergency	10
Fire	9
School	8
СМ	7
Other	6

(10M)

- 4A. Write a complete C++ program to insert the record of a student(name, rollno, age) in a doubly linked list at a node specified by position. (only insert and create function with main ())
- 4B. Define pop() functions for multiple stack. Assume that all necessary functions and classes have been defined.

(7M+3M)

- 5A. Write a the Quick Sort function . Trace the function for the values: 45, 26, 27, 70, 14, 90
- 5B. Create a binary search tree for : 45, 39, 56, 12, 34, 78, 32, 10, 89, 54, 67, 81. Consider 45 as root node. Also traverse the tree in preorder, manually shown with arrow path, and write the path of traversal.

(4M+6M)
