



INTERNATIONAL CENTRE FOR APPLIED SCIENCES
(MAHE)
III-SEMESTER B.S. DEGREE EXAMINATION – NOV/DEC 2021
SUBJECT: DATA STRUCTURES (ICS 231)
(BRANCH:CS)

Time: 3 Hours

Date: 19 Nov 2021

Max. Marks: 50

- ✓ Answer FULL Questions.
- ✓ Missing data, if any, may be suitably assumed

1A. Differentiate between looping and recursion [any three meaningful points]. Define recursive factorial function and draw the memory frame for the recursive call for $N = 3$.

1B. What is Big Oh notation? Derive the average case time complexity for QuickSort and present it in terms of Big Oh notation.

(5M+5M)

2A. Trace the algorithm of infix expression to postfix expression for the following infix expression: [no need to write the algorithm]

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.

(6M+4M)

3A. Create a doubly linked list with student data : name, roll_number and CGPA with the help of insertFirst() function. Write a complete C++ program to display the details of the student with the highest CGPA. [Display() contains the code to find the highest CGPA.]

3B. Calculate **C** and **n₀** for the function: **$5n^3 + 6n - 3$** **(8M+2M)**

4A. Write a C++ program to create a circular priority queue where data value indicates its priority. [only define : class PQ with necessary data members and member functions: insert() and delete() ,other codes need not to be written]

4B. Define pop() functions for multiple stack. Assume that all necessary functions and classes have been defined. **(6M+4M)**

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.

(10M)

