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INTERNATIONAL CENTRE FOR APPLIED SCIENCES (MAHE)

III SEMESTER B.Sc. (Applied Sciences) MAKE -UP EXAMINATION – January 2022

SUBJECT: DATA STRUCTURES (ICS 231)
(BRANCH:CS)

Time: 3 Hours **Date: 08th January 2022** **Max. Marks: 50**

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

1A. Solve Hanoi of tower for 4 discs considering three pillar/bars/pegs. Draw all the steps neatly.

1B. Create a header file with recursive Print ( ) function, name the file appropriately. Add the header file in your source code which contains main ( ). Call Print ( ) in main ( ) and print N natural numbers from 1 to N. {Write necessary comments.}

Prototype of Print ( ): void Print (int)

(6M+4M)

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. 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)

3A. Write a complete C++ program to implement stack through single linked list.

3B, Calculate **C** and $\mathbf{n_0}$ for the function: $\mathbf{5n^4+6n^2-3}$

(8M+2M)

4A. Given two doubly LinkedLists A and B, representing 2 sorted lists, write a mergeList( ) function to create a new linked list C, by merging these two lists so that the resultant list should be a sorted list. [Prototype: LinkedList meregeList (LinkedList)]

4B. Trace Insertion sort for the following values (Snap shots , no coding):

45, 26, 27, 70, 14, 90

(4M+6M)

5. Given a list of numbers: 45, 39, 56, 12, 34, 78, 32, 10, 89, 54, 67, 81. Show each phase of creating a Binary search tree using them, starting from 45.
Traverse this tree by manual way, shown with arrow path and write the path of traversal in:
Preorder,
Inorder and
Postorder way. **(10 M)**