



School of Information Technology and Engineering

Fall Semester 2022-2023

Continuous Assessment Test – I

Programme Name & Branch : MCA

Course Name & Code: ITA5002 – Problem Solving with Data Structures and Algorithms

Class Number (s): VL2022230105092, VL2022230105099, VL2022230105106.

Slot: C2 + TC2

Faculty Names: Dr. Chandra Mouliswaran S, Dr. Dharmendra Singh Rajput, Prof. Nagarajan B

Exam Duration: 90 Min.

Maximum Marks: 50

General Instruction(s):

Answer ALL Questions (5 * 10 = 50 Marks)

1. a) Describe the various asymptotic notations that are used for algorithm analysis and explain with suitable examples. (6 Marks)

- b) Consider the following snippet and analyze the time complexity. (4 Marks)

fun()

```
{  
  for(i=1; i<=n; i++)  
    for(j=1; j<=n; j=j+i)  
      printf("hello");  
}
```

1 → 1+2+3+4+...+n = $\frac{n(n+1)}{2} = 10$
2 → 1+3+... = 6
3 → 1+4+... = 10
4 → 1 = 5 = 6
Total = 10 + 6 + 10 + 6 = 32

a b c
a b c

2. Develop the functions to insert an element into a circular queue and delete an element from the circular queue using array implementation.

- ✓ a) Write the pseudo-code to represent the polynomial expression of the form $6X^3 + 9X^2 + 7X + 1$ using linked list. (5 Marks)

- b) Devise an algorithm to add two polynomial equations using linked list. (5 Marks)

- ✓ a) Design an algorithm to convert the infix expression to postfix expression. Apply the algorithm and show the contents of stack during the conversion for the expression: $a + b * c + (d + e + f) / g$ (6 Marks)

- b) Evaluate the given postfix expression using stack: $9\ 3\ 4\ *\ 8\ +\ 4\ /\ -$ (4 Marks)

- ✓ Develop an algorithm to create, insert and search an element in Binary search tree. Create Binary search tree for the following list of elements which are inserted into an empty binary search tree: 14, 15, 4, 9, 7, 18, 3, 5, 16, 20, 17, 9.