

Department of Computer Science
University of Delhi
MCAC103: Data Structure (CIA-I)

Time: 1 hour

October 23, 2024

Maximum Marks: 15

1. Determine the time complexity of the following code snippet. [2]

```
for (i = 1; i <= n * n; i++) {  
    for (j = 0; j < i; j++) {  
        sum++;  
    }  
}
```

2. Postorder traversal of a given binary search tree, T, produces the following sequence of keys 10, 9, 23, 22, 27, 25, 15, 50, 95, 60, 40, 29. Which one of the following sequences of keys can be the result of an in-order traversal of the tree T? [4]

- (i) 9, 10, 15, 22, 40, 50, 60, 95, 23, 25, 27, 29
- (ii) 29, 15, 9, 10, 25, 22, 23, 27, 40, 60, 50, 95
- (iii) 95, 50, 60, 40, 27, 23, 22, 25, 10, 9, 15, 29
- (iv) 9, 10, 15, 22, 23, 25, 27, 29, 40, 50, 60, 95

3. Convert the following infix expression to a postfix expression. Show the state of the operator stack at each of the indicated points (A, B, and C): [4]

$$14 + 18 * 9 - 3 + (4 - 8) * (9 - 6) / 2$$

^ ^ ^
 A B C

4. Consider n elements that are equally distributed in k stacks. In each stack, elements are arranged in ascending order (min is at the top in each of the stacks and then increases downwards). We need to create a queue of size n that contains all n elements in increasing order. Write a pseudocode for a function that achieves this, and determine the time complexity of the best-known algorithm. [5]