

# National University of Computer and Emerging Sciences



## Laboratory Manual

*for*

## Data Structures Lab

Course Instructor	Ms. Syeda Tayyaba Bukhari
Lab Instructor(s)	Ms. Fariha Maqbool
Section	BDS-3A
Semester	Fall 2022

## Department of Computer Science

FAST-NU, Lahore, Pakistan

**Objectives:**

In this lab, students will practice:

1. Revision of Templates
2. Time complexity
3. Friend Class

**Question 1:**

**Find the time complexity of following piece of codes and show proper working.**

```
1) Void func (int n) {  
    int i, j, k, count = 0;  
    for (i = n/2; i <= n; i++)  
        for (j = 1; j+n/2 <= n; j++)  
            for (k = 1; k <= n; k = k*2)  
                count ++;  
}
```

```
2) int x = 2;  
    int i;  
    x = x +1;  
  
    for (i = 1; i <= n; i++){  
        //statements  
    }  
  
    for (i = 1; i <= n; i++) {  
        for (j = 1; j <= n; j++) {  
            //statements  
        }  
    }  
}
```

```
3) scanf("%d", &n);  
    if (n == 0) {  
        //statements  
    }  
    else {  
        for(i = 1; i<=n; i++)  
            //statements  
    }  
}
```

**Question 2:** Write a C++ Program to swap data using function template.

Output Sample:

Before passing data to function template.

i1 = 6

i2 = 3

f1 = 7.2

f2 = 4.5

c1 = p

c2 = x

After passing data to function template.

i1 = 3

i2 = 6

f1 = 4.5

f2 = 7.2

c1 = x

c2 = p

Exit code: 0 (normal program termination)

**Question 3:**

Create a class **Shape** that have data members as follows:

- length
- width

It should also have:

- Constructors (To set the values of length and width)
- Destructor
- Getters, Setters

Make a **Friend** class of Shape called **Rectangle**. It should have following functions:

- calculateArea
- calculatePerimeter

It calculates the area and perimeter by using the data members of Shape class.

In main () function, make an object of class Rectangle that takes the length and width from user and calculates the area and perimeter of rectangle.