Sonargao University(SU)

Lab Report on OOP(C++) lab classes.

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Learning Outcomes:

(1)Creating C++ programs.(2)Using function in C++.(3)Describe OOP's concepts.
(4)Classes and objects in C++.(5)Array types and their implementaion
(6) Implementing OOPs Concepts in C++
(7) Constructor and Destructor.

What is C++?

C++ is a general-purpose programming language. It's used in a wide range of industries including software and game development, VR, robotics, and scientific computing. C++ gives programmers a high level of control over system resources and memory. C++ was developed by <u>Bjarne Stroustrup</u> at Bell Labs in 1979, as an extension to the C language.

Why use C++?

C++ is one of the world's most popular programming languages. C++ can be found in today's operating systems, Graphical User Interfaces, and embedded systems. C++ is an object-oriented programming language which gives a clear structure to programs and allows code to be reused, lowering development costs .C++ is portable and can be used to develop applications that can be adapted to multiple platforms.

What is OOP?

OOP stands for Object-Oriented Programming. OOP is a methodology or paradigm to design a program using classes and objects. In other words, object-oriented programming is about creating objects that contain both data and functions. Apart from objects and classes, OOP has four core concepts which are listed below:

• Encapsulation
• Abstraction
• Inheritance
• Polymorphism

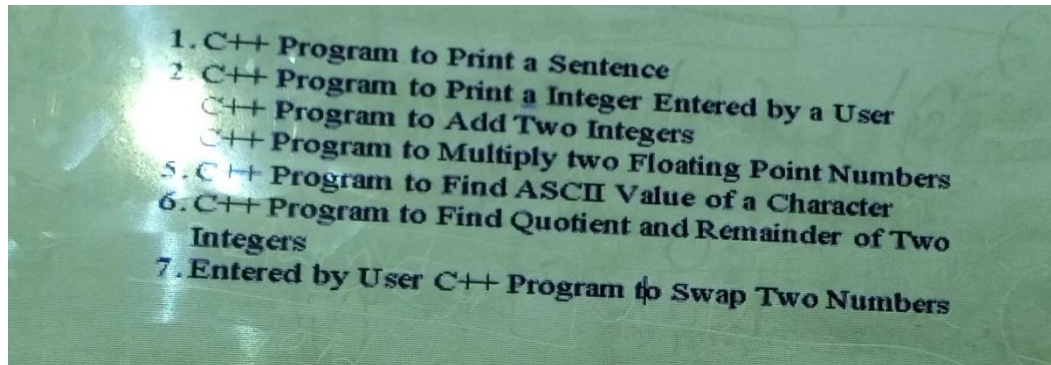**C++ Classes and Objects.**

Object:
An object is a real-world entity such as mobile, car, chair, table, pen etc. that has states/attributes and behaviors/methods. Here, states mean data/variables and behaviors mean functions. These are often referred to as "class members".

Class:

A class is a template from which objects are created. In other words, class is a user-defined data type that we can use in our program, and it works as a "blueprint" for creating objects. So, we can say that class is the collection of the similar kind of objects.

Lab Class-01

1. C++ Program to Print a Sentence
2. C++ Program to Print a Integer Entered by a User
3. C++ Program to Add Two Integers
4. C++ Program to Multiply two Floating Point Numbers
5. C++ Program to Find ASCII Value of a Character
6. C++ Program to Find Quotient and Remainder of Two Integers
7. Entered by User C++ Program to Swap Two Numbers

Lab class -01 Solution:

(01)

```cpp
#include<iostream>
using namespace std;
int main(){
    cout<<"Rafi Ahmed is a good boy."<<endl<<"And He is so smart";
}
```
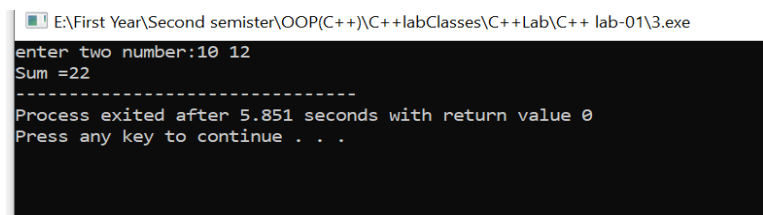

(02)
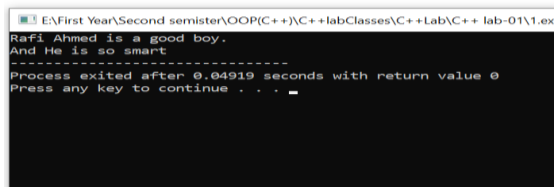
```cpp
#include<iostream>
using namespace std;
int main(){
    int num;
    cout<<"Enter an integer: ";
    cin>>num;
    cout<<"you have entered :"<<num;
    return 0;
}
```


(03)
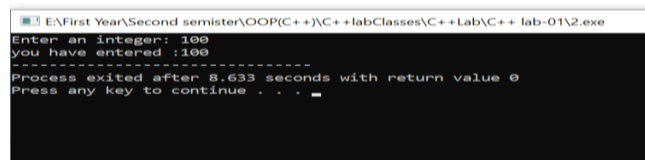
```cpp
#include<iostream>
using namespace std;
int main(){
    int num1,num2;
cout<<"enter two number:";
cin>>num1>>num2;

cout<<"Sum ="<<num1+num2;
return 0;
}
```
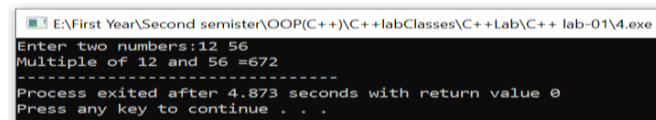
(04)
```cpp
#include<iostream>
using namespace std;
int main(){
    float num1,num2;
    cout<<"Enter two numbers:";
    cin>>num1>>num2;
    cout<<"Multiple of " <<num1<< " and " << num2<< " ="<<num1*num2;
    return 0;
}
```
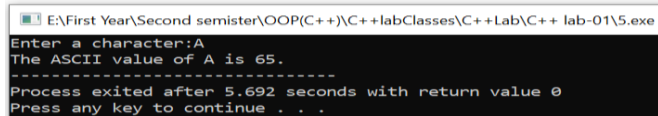
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++ lab-01\4.exe
```
Enter two numbers:12 56
Multiple of 12 and 56 =672
--------------------------------
Process exited after 4.873 seconds with return value 0
Press any key to continue . . .
```

(05)
```cpp
#include<iostream>
using namespace std;
int main(){
    char ch;
    cout<<"Enter a character:";
    cin>>ch;
    cout<<"The ASCII value of " <<ch<< " is "<<int(ch)<<".";
    return 0;
}
```
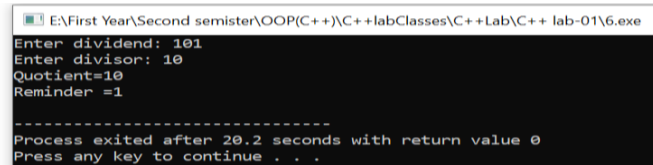
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++ lab-01\5.exe
```
Enter a character:A
The ASCII value of A is 65.
--------------------------------
Process exited after 5.692 seconds with return value 0
Press any key to continue . . .
```

(06)
```cpp
#include<iostream>
using namespace std;
int main(){
    int divisor,dividend,quotient,reminder;
    cout<<"Enter dividend: ";
    cin>>dividend;
    cout<<"Enter divisor: ";
    cin>>divisor;
    quotient=dividend/divisor;
    reminder=dividend%divisor;
    cout<<"Quotient="<<quotient<<endl;
    cout<<"Reminder ="<<reminder<<endl;
    return 0;
}
```
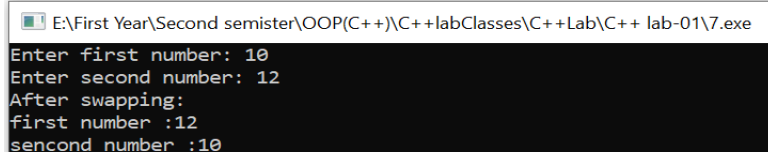
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++ lab-01\6.exe
```
Enter dividend: 101
Enter divisor: 10
Quotient=10
Reminder =1

--------------------------------
Process exited after 20.2 seconds with return value 0
Press any key to continue . . .
```

(07)

```cpp
#include<iostream>
using namespace std;
int main(){
    int n1,n2,temp;
    cout<<"Enter first number: ";
    cin>>n1;
    cout<<"Enter second number: ";
    cin>>n2;
    temp=n1;
    n1=n2;
    n2=temp;
    cout<<"After swapping:\nfirst number :"<<n1<< "\nsencond number :"<<n2;
}
```
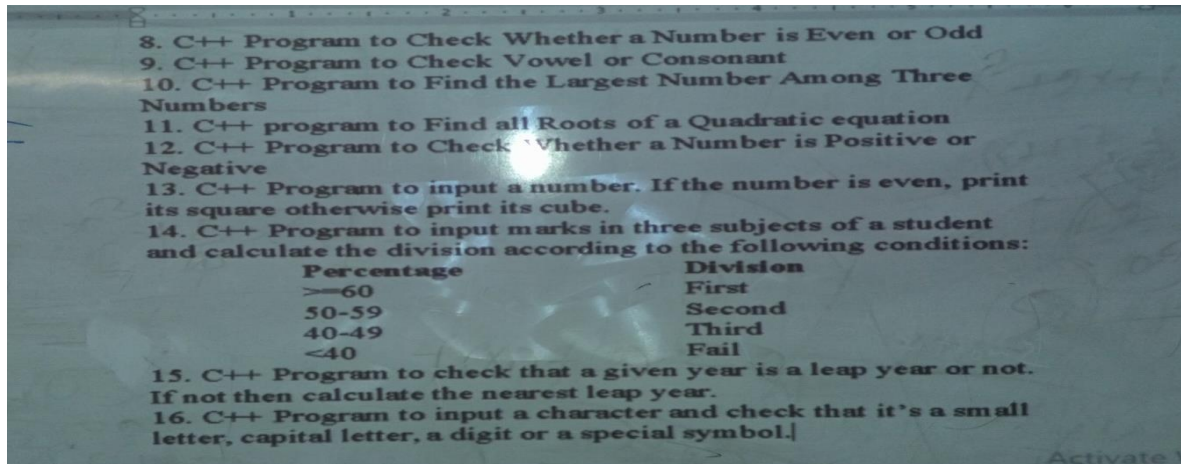
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++ lab-01\7.exe
```
Enter first number: 10
Enter second number: 12
After swapping:
first number :12
sencond number :10
```

Lab-02 Problems:


```
8. C++ Program to Check Whether a Number is Even or Odd
9. C++ Program to Check Vowel or Consonant
10. C++ Program to Find the Largest Number Among Three
Numbers
11. C++ program to Find all Roots of a Quadratic equation
12. C++ Program to Check Whether a Number is Positive or
Negative
13. C++ Program to input a number. If the number is even, print
its square otherwise print its cube.
14. C++ Program to input marks in three subjects of a student
and calculate the division according to the following conditions:
        Percentage              Division
        >=60                    First
        50-59                   Second
        40-49                   Third
        <40                     Fail
15. C++ Program to check that a given year is a leap year or not.
If not then calculate the nearest leap year.
16. C++ Program to input a character and check that it's a small
letter, capital letter, a digit or a special symbol.
```

Lab-02 problems solutions:

(01)
```cpp
#include<iostream>
using namespace std;
int main(){
    while(1){
    int num;
    cin>>num;
    if(num%2==0){
        cout<<"Even"<<endl;
    }else{
        cout<<"Odd"<<endl;
    }
    }
}
```
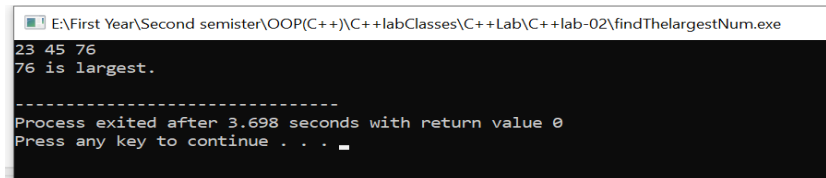

(02)
```cpp
#include<iostream>
using namespace std;
int main(){
    char ch;
    cin>>ch;
    if(ch=='A' || ch=='E' || ch=='I' || ch=='O' || ch=='U' || ch=='a' ||
ch=='e' || ch=='i' || ch=='o' || ch=='u'){
        cout<<"vowel.\n";
    }else{
        cout<<"Consonant.\n";
    }
}
```

(03)
```cpp
#include<iostream>
using namespace std;
int main(){
    int n1,n2,n3;
    cin>>n1>>n2>>n3;
    if(n1>n2 && n1>n3){
        cout<<n1<<" is largest."<<endl;
    }else if(n2>n3 && n2>n1){
        cout<<n2<<" is largest."<<endl;
    }else{
        cout<<n3<<" is largest."<<endl;
    }
}
```
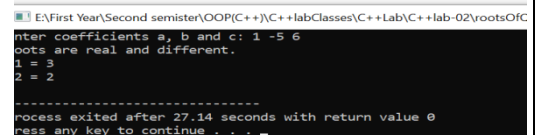

(04)
```cpp
#include <iostream>
#include <cmath>
using namespace std;

int main() {

    float a, b, c, x1, x2, discriminant, realPart, imaginaryPart;
    cout << "Enter coefficients a, b and c: ";
    cin >> a >> b >> c;
    discriminant = b*b - 4*a*c;

    if (discriminant > 0) {
        x1 = (-b + sqrt(discriminant)) / (2*a);
        x2 = (-b - sqrt(discriminant)) / (2*a);
        cout << "Roots are real and different." << endl;
        cout << "x1 = " << x1 << endl;
        cout << "x2 = " << x2 << endl;
    }

    else if (discriminant == 0) {
        cout << "Roots are real and same." << endl;
        x1 = -b/(2*a);
        cout << "x1 = x2 =" << x1 << endl;
    }

    else {
        realPart = -b/(2*a);
        imaginaryPart =sqrt(-discriminant)/(2*a);
        cout << "Roots are complex and different."  << endl;
        cout << "x1 = " << realPart << "+" << imaginaryPart << "i" << endl;
        cout << "x2 = " << realPart << "-" << imaginaryPart << "i" << endl;
    }
    return 0;     }
```
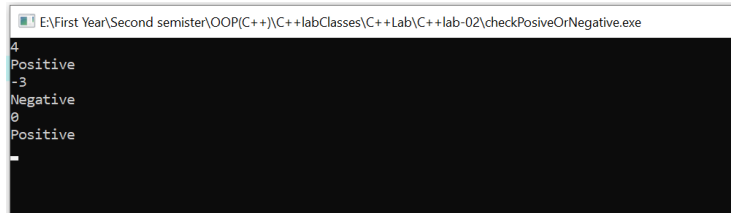
(05

```cpp
#include<iostream>
using namespace std;
int main(){
    int num;
    cin>>num;
    if(num>=0){
        cout<<"Positive"<<endl;
    }else{
        cout<<"Negative"<<endl;
    }
    return 0;
}
```


(06)

```cpp
#include<iostream>
using namespace std;
int main(){
    int num,square,cube;
    cin>>num;
    if(num%2==0){
        square=num*num;
        cout<<"Square of "num<< "="<<square<<endl;
    }else{
        cube=num*num*num;
         cout<<"Cub of "num<< "="<<cube<<endl; }
}
```
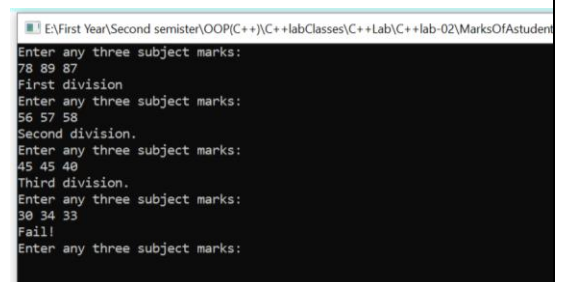

(07)

```cpp
#include<iostream>
using namespace std;
int main(){
    int percentage;
    while(1){
    int totalMarks=0,parcentage=0,marks[100];
        cout<<"Enter any three subject marks:"<<endl;
        for(int i=0;i<3;i++){
            cin>>marks[i];
        }
        for(int i=0;i<3;i++){
            totalMarks=totalMarks+marks[i];
        }
        parcentage=(totalMarks*100)/300;

        if(parcentage>=60 && parcentage<=100){
            cout<<"First division"<<endl;
        }else if(parcentage>=50 && parcentage<=59){
            cout<<"Second division."<<endl;
        }else if(parcentage>=40 && parcentage<=49){
            cout<<"Third division."<<endl;
        }else{
            cout<<"Fail!"<<endl;
        }
    }
}
```
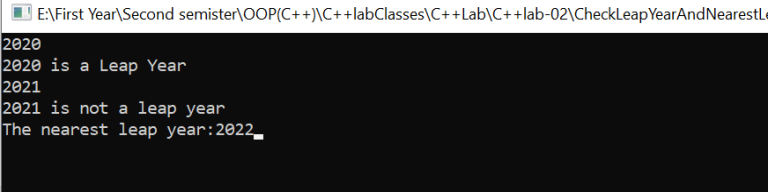
(08)

```cpp
#include<iostream>
using namespace std;
int main(){
    int year;
    cin>>year;
    if(year%400==0 || (year%100!=0 && year%4==0)){
        cout<<year<<" is a Leap Year"<<endl;
    }else{
        cout<<year<<" is not a leap year"<<endl;
    }
}
```
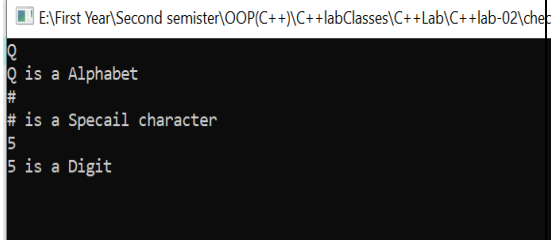


```
2020
2020 is a Leap Year
2021
2021 is not a leap year
The nearest leap year:2022
```

(09)

```cpp
#include<iostream>
using namespace std;
int main(){
    char ch;
    cin>>ch;
    if(ch>='a' && ch<='z'|| ch>'A' && ch<='Z'){
        cout<<ch<<" is a Alphabet"<<endl;
    }else if(ch>='0' && ch<='9'){
        cout<<ch<<" is a Digit"<<endl;
    }else{
        cout<<ch<<" is a Specail character"<<endl;
    }
}
```



```
Q
Q is a Alphabet
#
# is a Specail character
5
5 is a Digit
```

Lab class -03

1. Write a c++ program to accept 3 numbers from user one by one and displays their sum o screen.
2. Write a C++ program to find out the sum of series 1 + 2 + ... + n
3. Write a C++ program to find out the sum of series 1^2 + 2^2 + ... + n^2.
4. Write a C++ program to find out the sum of series 1^3 + 2^3 + ... + n^3.
5. Write a C++ program to find out the sum of series 1 + 2 + 4 + 8 ... to infinity.
6. Write a C++ program to find out factorial value of given number.
7. Write a C++ program to find out NPR factor of given number.
8. Write a C++ program to find out NCR factor of given number.
9. Write a C++ Program to Count Number of Digits of an Integer.
10. Write a C++ Program to Reverse a Number.
11. Write a C++ program to Calculate the Power of a Number
12. Write a C++ Program to find largest of n numbers.
13. Write a C++ program to input any number from user and displays the total of its digits (o/p : 6)

Lab class-03 problems solutions:

(01)

```cpp
//To accept 3 numbers from useer one by one and display their sum
#include<iostream>
using namespace std;
int main(){
    int n1,n2,n3,sum=0;
    cout<<"Enter first number: "<<endl;
    cin>>n1;
    cout<<"Enter second number: "<<endl;
    cin>>n2;
    cout<<"Enter third number: "<<endl;
    cin>>n3;
    sum=n1+n2+n3;
    cout<<"The sum ="<<sum;
}
```

(02)

```cpp
//sum of series 1+2+3+4......+n
#include<iostream>
using namespace std;
int main(){
    int num,i,sum=0;
    cin>>num;
    for(i=1;i<=num;i++){
        sum+=i;
    }
    cout<<"Sum = "<<sum<<endl;
}
```

(03)
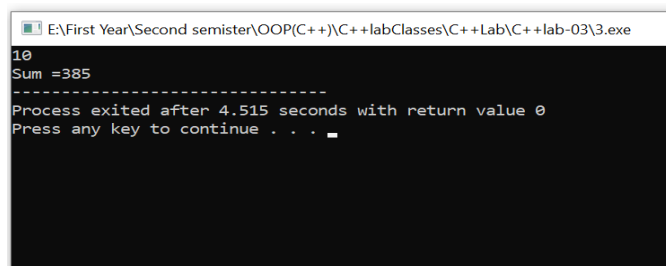
```cpp
//sum of series 1^2+2^2+3^2+4^2......+n^2
#include<iostream>
using namespace std;
int main(){
    int num,i,sum=0;
    cin>>num;
    for(i=1;i<=num;i++){
        sum+=i*i;
    }
    cout<<"Sum ="<<sum;
}
```
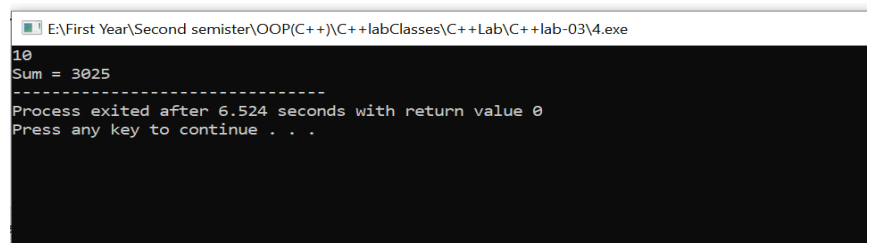


```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-03\3.exe
10
Sum =385
--------------------------------
Process exited after 4.515 seconds with return value 0
Press any key to continue . . .
```

(04)

```cpp
//sum of series 1^3+2^3+3^3+4^3......+n^3
#include<iostream>
using namespace std;
int main(){
    int num,i,sum=0;
    cin>>num;
    for(i=1;i<=num;i++){
        sum+=i*i*i;
    }
    cout<<"Sum = "<<sum;
}
```



```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-03\4.exe
10
Sum = 3025
--------------------------------
Process exited after 6.524 seconds with return value 0
Press any key to continue . . .
```

(05)

```cpp
//sum of seriese 1+2+4+8+.....+n
#include<iostream>
using namespace std;
void sumOfdouble(int num){
    int i,sum=0;
    for(i=1;i<=num;i=i*2){
        sum=sum+i;
    }
    cout<<sum<<endl;
}

int main(){
    int num;
    cin>>num;
//  sumOf(num);
    sumOfdouble(num);

}
```
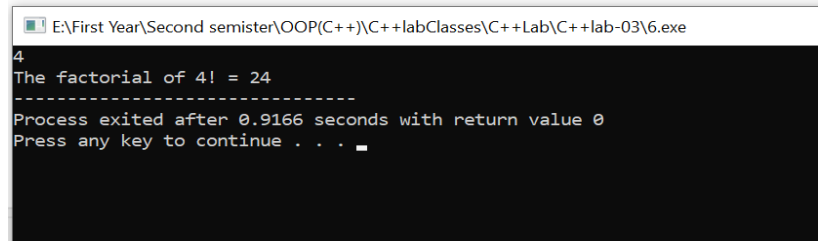


```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-03\5.exe
8
15

--------------------------------
Process exited after 1.607 seconds with return value 0
Press any key to continue . . .
```

(06)
```cpp
//nPr value
#include<iostream>
using namespace std;
int main(){
    int n,r,fact_n=1,fact_NminusR=1,nPr,i,j;
    cout<<"Enter the value of n:"<<endl;
    cin>>n;
    cout<<"Enter the value of r: "<<endl;
    cin>>r;
    for(i=1;i<=n;i++){
        fact_n*=i;
    }
    for(j=1;j<=n-r;j++){
        fact_NminusR*=j;
    }
    nPr=fact_n/fact_NminusR;
    cout<<n<<"P"<<r <<" = "<<nPr;

}
```



```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++-lab-03\6.exe
4
The factorial of 4! = 24
-------------------------------
Process exited after 0.9166 seconds with return value 0
Press any key to continue . . .
```

(07)
```cpp
//nPr value
#include<iostream>
using namespace std;
int main(){
    int n,r,fact_n=1,fact_NminusR=1,nPr,i,j;
    cout<<"Enter the value of n:"<<endl;
    cin>>n;
    cout<<"Enter the value of r: "<<endl;
    cin>>r;
    for(i=1;i<=n;i++){
        fact_n*=i;
    }
    for(j=1;j<=n-r;j++){
        fact_NminusR*=j;
    }
    nPr=fact_n/fact_NminusR;
    cout<<n<<"P"<<r <<" = "<<nPr;

}
```
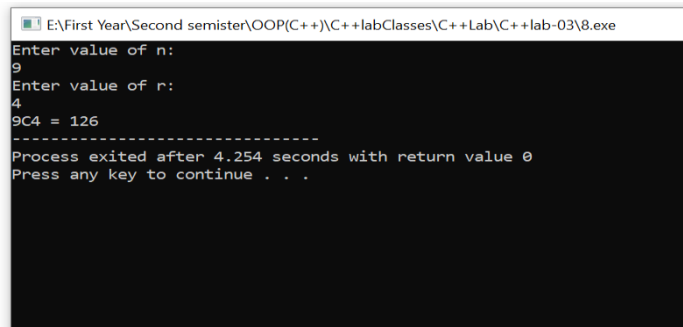


```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++-lab-03\7.exe
Enter the value of n:
7
Enter the value of r:
3
7P3 = 210
-------------------------------
Process exited after 7.04 seconds with return value 0
Press any key to continue . . .
```

(o8)
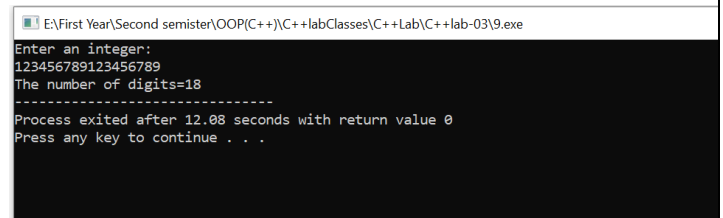
```cpp
//nCr value
#include<iostream>
using namespace std;
int main(){
    int n,r,fact_n=1,fact_r=1,fact_NminuR=1,i,j,k,nCr;
    cout<<"Enter value of n: "<<endl;
    cin>>n;
    cout<<"Enter value of r: " <<endl;
    cin>>r;
    for(i=1;i<=n;i++){
        fact_n*=i;
    }
    for(j=1;j<=r;j++){
        fact_r*=j;
    }
    for(k=1;k<=n-r;k++){
        fact_NminuR*=k;
    }
    nCr=fact_n/(fact_r*fact_NminuR);
    cout<<n<<"C"<<r <<" = "<<nCr;
}
```
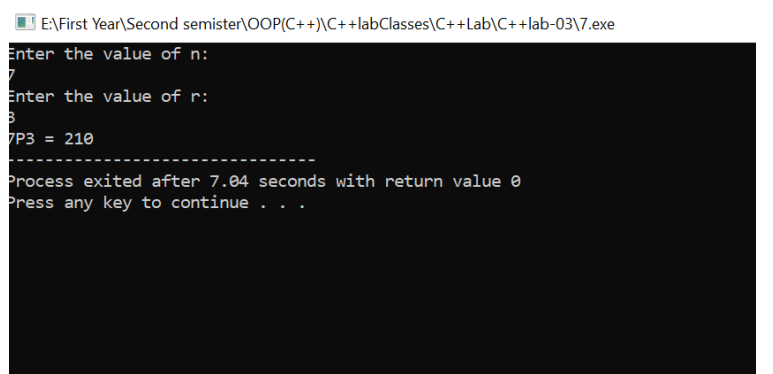
Enter value of n:
9
Enter value of r:
4
9C4 = 126

Process exited after 4.254 seconds with return value 0
Press any key to continue . . .

(09)
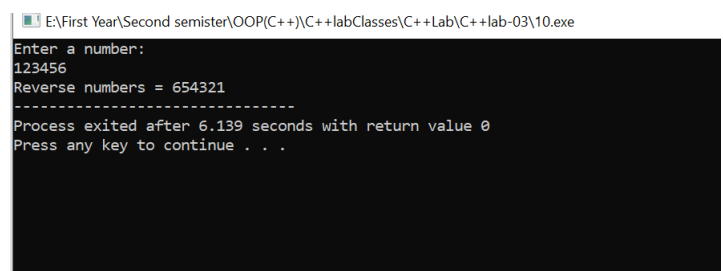
```cpp
//counts the number of digits of an number
#include<iostream>
using namespace std;
int main(){
    long long int num,counter=0;
    cout<<"Enter an integer: "<<endl;
    cin>>num;
    while(num!=0){
        num/=10;
        counter++;
    }
    cout<<"The number of digits="<<counter;
}
```

Enter an integer:
123456789123456789
The number of digits=18

Process exited after 12.08 seconds with return value 0
Press any key to continue . . .

(10)

```cpp
#include<iostream>
using namespace std;
int main(){
    int num,rem,rev=0;
    cout<<"Enter a number: "<<endl;
    cin>>num;
    while(num!=0){
        rem=num%10;
        rev=rev*10+rem;
        num/=10;
    }
        cout<<"Reverse numbers"<<" = "<<rev;
}
```

Enter a number:
123456
Reverse numbers = 654321

Process exited after 6.139 seconds with return value 0
Press any key to continue . . .

(11)
```cpp
//power of a number
#include<iostream>
#include<cmath>
using namespace std;
int main(){
    int num,power;
    cout<<"Enter a number: "<<endl;
    cin>>num;
    power=pow(num,2);
    cout<<"Power of "<<num <<" = "<<power;
}
```



```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-03\11.exe
Enter a number:
5
Power of 5 = 25
-------------------------------
Process exited after 3.834 seconds with return value 0
Press any key to continue . . .
```

(12)
```cpp
//largest number of n numbers
#include<iostream>
using namespace std;
int main(){
    long int arr[100],num,i;
    cout<<"How to many numbers are you using to find largest one"<<endl;
    cin>>num;
    for(i=0;i<num;i++){
        cin>>arr[i];
    }
    for(int j=1;j<num;j++){
        if(arr[0]<arr[j]){
            arr[0]=arr[j];
        }
    }
        cout<<"The largest number is ="<<arr[0];
    return 0;
}
```



```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-03\12.exe
How to many numbers are you using to find largest one
5
23 34 54 65 12
The largest number is =65
-------------------------------
Process exited after 16.78 seconds with return value 0
Press any key to continue . . .
```

(13)
```cpp
//input any number from user and displays the total of it's digits
#include<iostream>
using namespace std;
int main(){
    int num,rem,sum=0;
    cout<<"Enter a number: "<<endl;
    cin>>num;
    while(num!=0){
        rem=num%10;
        sum=sum+rem;
        num/=10;
    }
    cout<<"Sum is = "<<sum;
}
```



```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-03\13.exe
Enter a number:
1234
Sum is = 10
-------------------------------
Process exited after 8.897 seconds with return value 0
Press any key to continue . . .
```

Lab class -04

Lab class-04 problems:
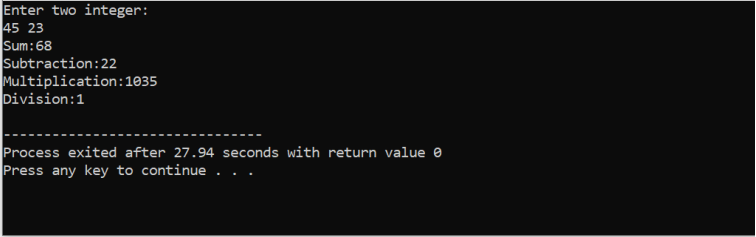
1. Write a C++ program that take four functions that gets two integer and returns its sum, subtraction, multiplication, division.
2. Write a C++ program that take two functions that gets three integers and returns maximum and minimum.
3. Write a function that gets length and width of a rectangle and returns area.
4. Write a function that gets radius of a circle and returns area.
5. Write a function that gets three numbers and returns medium.
6. Write a function that gets any positive number and returns its factorial.
7. Write a function that gets any positive number and returns sum of its digit.
8. Write a function that gets any positive number and returns digital root.
9. Write a function that gets any positive integer and returns its reverse.
10. C++ program to check prime number using user defined function.

Lab class-04 problems solutions:

(01)

```cpp
//write a C++ program that take four functions that gets two integer and
returns  its sum,subtraction,multiplication,division
#include<iostream>
using namespace std;
int sum(int x,int y){
    return x+y;
}
int subtraction(int x,int y){
    return (x-y);
}
int multiplication(int x,int y){
    return (x*y);
}
float division(int x,int y){
    return (x/y);
}
int main(){
    int n1,n2;
    cout<<"Enter two integer:"<<endl;
    cin>>n1>>n2;
    cout<<"Sum:"<<sum(n1,n2)<<endl;
    cout<<"Subtraction:"<<subtraction(n1,n2)<<endl;
    cout<<"Multiplication:"<<multiplication(n1,n2)<<endl;
    cout<<"Division:"<<division(n1,n2)<<endl;
    return 0;
}
```
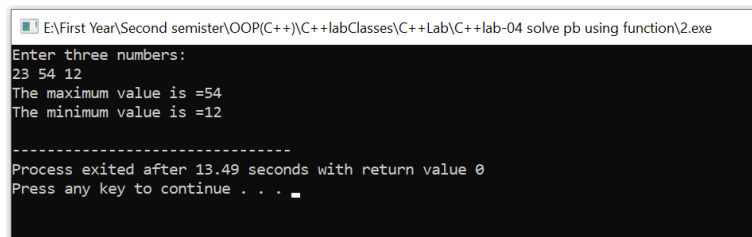
(02)

```cpp
//Write a C++ program that take two functions that gets three integers and
return maximum and minimum value

#include<iostream>
using namespace std;
int maximum(int x,int y,int z){
    if(x>=y && x>=z){
        return x;
    }else if(y>=x && y>=z){
        return y;
    }else{
        return z;
    }
}
int minimum(int x,int y,int z){
    if(x<=y && x<=z){
        return x;
    }else if(y<=x && y<=z){
        return y;
    }else{
        return z;
    }
}
int main(){
    int n1,n2,n3;
    cout<<"Enter three numbers:"<<endl;
    cin>>n1>>n2>>n3;
    cout<<"The maximum value is ="<<maximum(n1,n2,n3)<<endl;
    cout<<"The minimum value is ="<<minimum(n1,n2,n3)<<endl;
    return 0;
}
```



```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-04 solve pb using function\2.exe
Enter three numbers:
23 54 12
The maximum value is =54
The minimum value is =12

-------------------------------
Process exited after 13.49 seconds with return value 0
Press any key to continue . . .
```
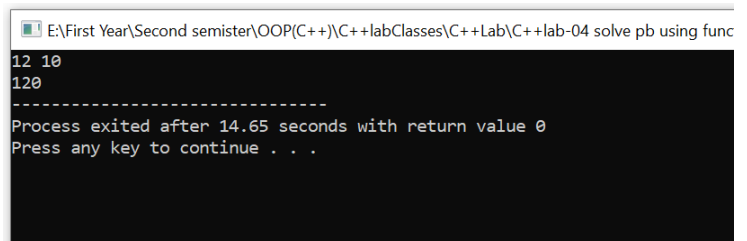
(03)

```cpp
//write a function that gets length and width of a rectangle and return area
#include<iostream>
using namespace std;
int rectangleArea(){
    int l,w;
    cin>>l>>w;
    return (l*w);
}
int main(){
    cout<<rectangleArea();
}
```
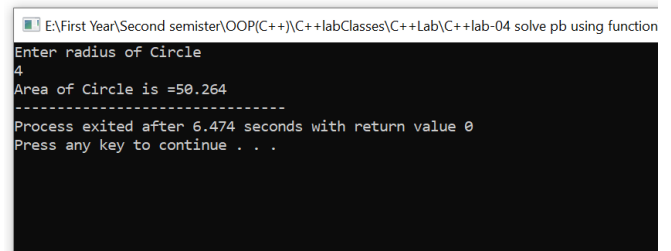


```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-04 solve pb using func
12 10
120
-------------------------------
Process exited after 14.65 seconds with return value 0
Press any key to continue . . .
```

(04)
```cpp
//write a function that gets radius of a circle and return area
#include<iostream>
#define pi 3.1415
using namespace std;
float areaOfCircle(int r){
    return (pi*r*r);
}
int main(){
    int r;
    cout<<"Enter radius of Circle"<<endl;
    cin>>r;
    cout<<"Area of Circle is ="<<areaOfCircle(r);
    return 0;
}
```



```
Enter radius of Circle
4
Area of Circle is =50.264
--------------------------------
Process exited after 6.474 seconds with return value 0
Press any key to continue . . .
```
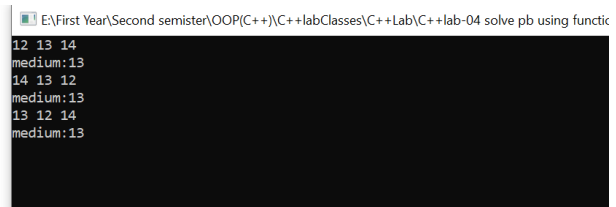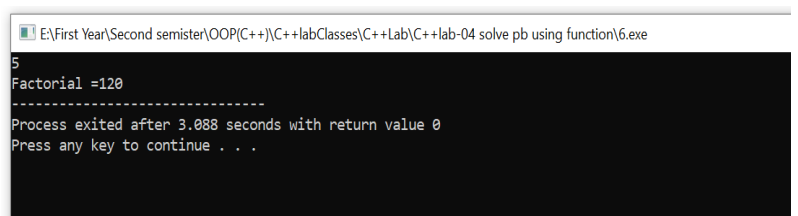
(05)
```cpp
//write a function that gets three numbers and returns medium
#include<iostream>
using namespace std;
int mediumOfthreenumbers(int x,int y,int z){
if(x>=y && x<=z || x<=y && x>=z){
    return x;
}else if(y>=x && y<=z || y<=x && y>=z){
    return y;
}else{
    return z;
}
}
int main(){
    int n1,n2,n3;
    while(1){
    cin>>n1>>n2>>n3;
    cout<<"medium:"<<mediumOfthreenumbers(n1,n2,n3)<<endl;
    }

    return 0;
}
```



```
12 13 14
medium:13
14 13 12
medium:13
13 12 14
medium:13
```

(06)
```cpp
#include<iostream>
using namespace std;
int factorial(int x){
    return x;
}
int main(){
    int n,fact=1,i;
    cin>>n;
    for(i=1;i<=n;i++)
     fact*=i;        }
    cout<<"Factorial ="<<factorial(fact);
return 0;
}
```



```
5
Factorial =120
--------------------------------
Process exited after 3.088 seconds with return value 0
Press any key to continue . . .
```

```cpp
(07)
#include<iostream>
using namespace std;
int sumOfdigits(){
    int n,r,sum=0;
    cout<<"Enter numbers:"<<endl;
    cin>>n;
    while(n!=0){
        r=n%10;
        sum+=r;
        n/=10;
    }
return sum;
}
int main(){
cout<<sumOfdigits();
}
```



```cpp
(08)
#include<iostream>
using namespace std;
#define ll long long
int main(){
ll n;
while(1)
{
cout<<"Enter the number to find Digital Root"<<endl;
cin>>n;
if(n==0)cout<<0<<endl;
else if(n%9==0)cout<<9<<endl;
else cout<<n%9<<endl;
}
return 0;
}
```



```cpp
(09)
#include<iostream>
using namespace std;
void reverseNumber(){
    int n,rem,rev=0;
    cin>>n;
    while(n!=0){
        rem=n%10;
        rev=rem+rev*10;
        n=n/10;
    }
    cout<<rev<<endl;
}
int main(){
    reverseNumber();

    return 0;
}
```
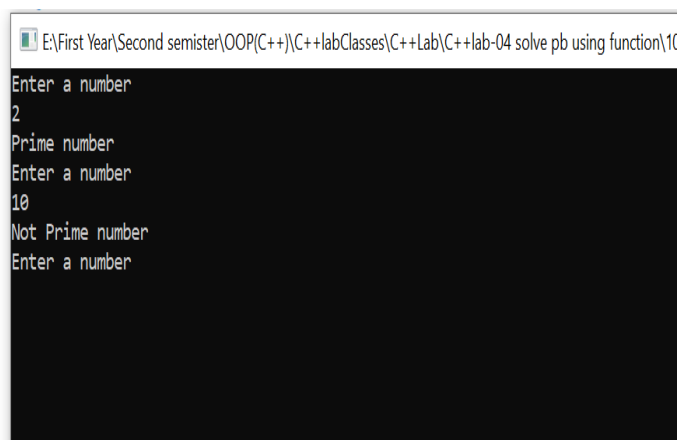
(10)
```cpp
//write a function to check prime number using defined function
#include<iostream>
using namespace std;
int primeNumber(){
    int n,i,counter=0;
    cout<<"Enter a number"<<endl;
    cin>>n;
    for(i=2;i<n/2;i++){
        if(n%i==0){
            counter++;
        }
    }if(counter==0){
        cout<<"Prime number"<<endl;
    }else{
        cout<<"Not Prime number"<<endl;
    }
}
using namespace std;
int main(){
    while(1){
        primeNumber();
    }
    return 0;
}
```

Lab class-05

Lab class-05 problems

(01)
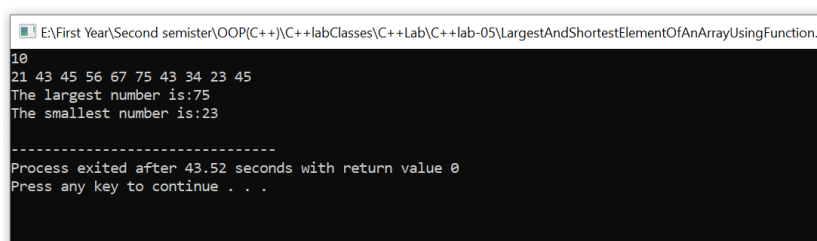
```cpp
#include<iostream>
using namespace std;
int avg(long int arr[],int size){
    int i,sum=0,average;
    for(i=0;i<size;i++){
        sum=sum+arr[i];
    }
    average=sum/size;
    return average;
}
int main(){
    int size,i;
    cin>>size;
    long int arr[size];
    for(i=0;i<size;i++){
        cin>>arr[i];
    }
    cout<<"The Average is:"<<avg(arr,size)<<endl;
}
```

(02)
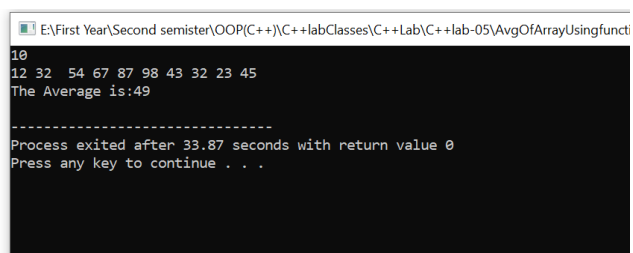
```cpp
#include<iostream>
using namespace std;
int largest(long int arr[],int size){
    for(int i=1;i<size;i++){
        if(arr[0]<arr[i]){
            arr[0]=arr[i];
        }
    }
    return arr[0];
}
int smallest(long int arr[],int size){
    for(int i=1;i<size;i++){
        if(arr[0]>arr[i]){
            arr[0]=arr[i];
        }
    }
    return arr[0];
}
int main(){
    int size,i;
    cin>>size;
    long int arr[size];
    for(i=0;i<size;i++){
        cin>>arr[i];
    }
    cout<<"The largest number is:"<<largest(arr,size)<<endl;
    cout<<"The smallest number is:"<<smallest(arr,size)<<endl;
}
```
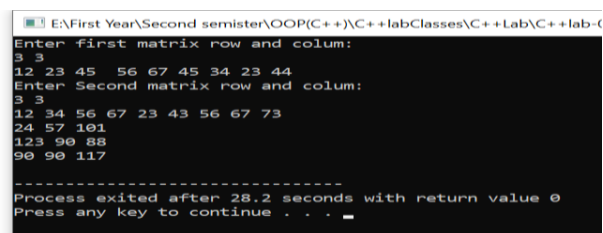


```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-05\LargestAndShortestElementOfAnArrayUsingFunction.

10
21 43 45 56 67 75 43 34 23 45
The largest number is:75
The smallest number is:23

-------------------------------
Process exited after 43.52 seconds with return value 0
Press any key to continue . . .
```

(03)

```cpp
#include<iostream>
using namespace std;
int add(long int A[][],int r1, int c1,long int B[][], int r2, int c2){
    int r,c;
    if(r1>r2)
    r=r1;
    else
    r=r2;
    if(c1>c2)
    c=c1;
    else
    c=c2;
 long int C[r][c];
    for(int i=0;i<r;i++){
        for(int j=0;j<c;j++){
            C[i][j]=A[i][j]+B[i][j];
        }
    }
    return C[i][j];
}
int main(){
    int r1,c1,r2,c2,i,j;
    cout<<"Enter first matrix row and colum:"<<endl;
    cin>>r1>>c1;
    long int A[r1][c1];
    for(i=0;i<r1;i++){
        for(j=0;j<c1;j++){
            cin>>A[i][j];
        }
    }
    cout<<"Enter Second matrix row and colum:"<<endl;
    cin>>r2>>c2;
    long int B[r2][c2];
    for(i=0;i<r2;i++){
        for(j=0;j<c2;j++){
            cin>>B[i][j];
        }
    }
    cout<<add(A,r1,c1,B,r2,c2);

}
```

(04)
```cpp
#include<iostream>
using namespace std;
int main(){
    int r1,c1,i,j;
    cout<<"Enter the first matrix row and colum:"<<endl;
    cin>>r1>>c1;
    long int A[r1][c1];
    for(i=0;i<r1;i++){
        for(j=0;j<c1;j++){
            cin>>A[i][j];
        }
    }
    int r2,c2;
    cout<<"Enter the first matrix row and colum:"<<endl;
    cin>>r2>>c2;
    long int B[r2][c2];
    for(i=0;i<r2;i++){
        for(j=0;j<c2;j++){
            cin>>B[i][j];
        }
    }
    int r,c;
    if(r1>=r2)
    r=r1;
    else
    r=r2;
    if(c1>=c2)
    c=c1;
    else
    c=c2;
    long int C[r][c];
        for(i=0;i<r;i++){//Initializing elemets of matrix to 0

        for(j=0;j<c;j++){
            C[i][j]=0;
        }
    }
    for(i=0;i<r;i++){//Multiplying matrix
        for(j=0;j<c;j++){
            for(int k=0;k<c;k++){
                C[i][j]+=A[i][k]*B[k][j];
            }
        }
    }
    for(i=0;i<r;i++){
        for(j=0;j<c;j++){
            cout<<C[i][j]<<" ";
            }
    cout<<"\n";
    }
}
```


E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-05\MultiplyTwoMatrixUsingFunction
```
Enter the first matrix row and colum:
3 3
1 2 3 4 5 6  7 8 9
Enter the first matrix row and colum:
3 3
1 2 3 4 5 6  7 8 9
30 36 42
66 81 96
102 126 150

------------------------------
```

```cpp
(05)
#include<iostream>
using namespace std;
long long int fibonacci(long long int n){
    return n;
}
int main(){
  long long int f1=0,f2=1,fn=0,n;
    cout<<"Enter any numbers:"<<endl;
    cin>>n;
    for(int i=1;i<=n;i++){
        cout<<fibonacci(f1)<<" ";
        fn=f1+f2;
        f1=f2;
        f2=fn;

    }
    return 0;
}
```



```cpp
(o6)
#include<iostream>
using namespace std;
void checkCharacter(char ch){
        if((ch>=97 && ch<=122) || (ch>=65 && ch<=90)){
        cout<<ch <<" is a Alphabet."<<endl;
    }else if(ch>=48 && ch<=57){
        cout<<ch <<" is a digit."<<endl;
    }else{
        cout<<ch <<" is a special character."<<endl;
    }
}
int main(){
    char ch;
    while(1){
    cout<<"Enter any character:"<<endl;
    cin>>ch;
    checkCharacter(ch);
    }

}
```

Lab class-06

1. Create a class called Box that contains one public function (print_volume) and three public variables (height and length and width). Declare the height, length and width as integer value. Use public function print_volume () to calculate the volume of a box and display the volume.

2. Create a class called person that maintains a register. In the register, it contains name and address and blood group, date of birth and an identification number. Store the name, address and blood group as string and the identification number as an integer value. Use two public functions contain () to store the name, address, date of birth, blood group and identification number. And another public function display () will display the information.

3. Create a class called card that maintains a library card catalog entry. In thecard, it will store a book's title, author and number of copies on hand. Store the title, author as string and the number of books on hand as an integer value. Use two public functions store () to store the title, author and number of books on hand. And another public function display () will display the information.

4. Simple class program to find prime number using class prime. And take the input value as a private member and declare two public member function get_input() to get the input from user. And another function is calculate () to calculate the input is prime or not and display it using calculate () function.

5. Simple class program to find factorial number using class factorial. And take the input value as a private member and declare two public member function get_input() to get the input from user. And another function is fact () to calculate the factorial of the input.

Lab-Class-06 Solutions:

(01)

```cpp
#include<iostream>
using namespace std;
class Box{//The class
    public://Access specifier
        int height,width,length; //Attribute(int variables)

        public:
            void PrintVolume(int x,int y,int z){
                int volume;
                height=x;
                width=y;
                length=z;
                volume=x*y*z;
                cout<<"Volume of the box ="<<volume;
            }
};
int main(){
    Box obj; //Create an object of Box
    int h,w,l;
    cout<<"Enter the heith,length,width of the box:"<<endl;
    cin>>h>>w>>l;
    obj.PrintVolume(h,w,l); //Call the method
    return 0;
}
```

(O2)

```cpp
#include<iostream>
#define size 3
using namespace std;
class Person{//The class
    private: //Access specifier
        string name,address,bloodGroup; //Attribute (string variables)
        int identificationNum; //Attribute(int variables)
        long int dateOfbirth[size];
        public:
            void Contain(string n,string a,string bg,int idn,long int db[]){
                name=n;
                address=a;
                bloodGroup=bg;
                identificationNum=idn;
                for(int i=0;i<size;i++){
                    dateOfbirth[i]=db[i];
                }
            }
            void Display(){
                cout<<"\t\t\t|........................................|\n";
                cout<<"\t\t\t|                                        |\n";
                cout<<"\t\t\t|              Register                  |\n";
                cout<<"\t\t\t|                                        |\n";
                cout<<"\t\t\t|........................................|\n";
                cout<<"\t\t\t\t\tName        :"<<name<<endl;
                cout<<"\t\t\t\t\tAddrress    :"<<address<<endl;
                cout<<"\t\t\t\t\tBloodGroup :"<<bloodGroup<<endl;
                cout<<"\t\t\t\t\tIdentificationNum:"<<identificationNum<<endl;
                cout<<"\t\t\t\t\tdateOfbirth:";
                for(int i=0;i<size;i++){
                    cout<<dateOfbirth[i]<<".";
                }
            }
};
int main(){
    Person obj; //Creating an object of Person
        string name,address,bloodGroup;
        int identificationNum,i;
        long int dateOfbirth[size];
        cout<<"Enter your name:\n"<<name;
        cin>>name;
        cout<<"Enter your Address:\n"<<address;
        cin>>address;
        cout<<"Enter your blood Group:\n"<<bloodGroup;
        cin>>bloodGroup;
        cout<<"Enter your identificationNum:\n"<<identificationNum;
```
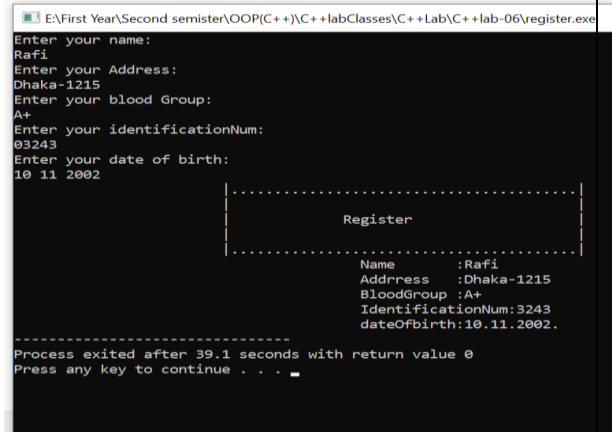
```cpp
        cin>>identificationNum;
        cout<<"Enter your date of birth:\n";
        for(i=0;i<size;i++){
            cin>>dateOfbirth[i];
        }
        obj.Contain(name,address,bloodGroup,identificationNum,dateOfbirth);
        obj.Display();//Call the method
    return 0;
}
```

(03)

```cpp
#include<iostream>
#include<string>
using namespace std;
class Card{//The class
    private:
        string title,author; //Attributes (string variables)
        int numberOfCopiesOnHand; //Attributes(int variables)
        public:
            void Store(string t,string a,int n){ //User defined function
                title=t;
                author=a;
                numberOfCopiesOnHand=n;
            }
            void Display(){
                cout<<"\n\n\t this is SU library card\n";
                cout<<"Title:"<<title<<endl;
                cout<<"Author Name:"<<author<<endl;
                cout<<"Number of copies on hand:"<<numberOfCopiesOnHand<<endl;

            }
};
int main(){
    Card obj; //Creating an object of Card
    string title,author;
    int numberOfCopiesOnHand;
    cout<<"Enter title"<<endl;
    cin>>title;
    cout<<"Enter Author Name"<<endl;
    cin.ignore();
    getline(cin,author);
    cout<<"Enter Number of copies on hand:"<<endl;
    cin>>numberOfCopiesOnHand;
    obj.Store(title,author,numberOfCopiesOnHand); //Call the method
    obj.Display();
    return 0;
}
```
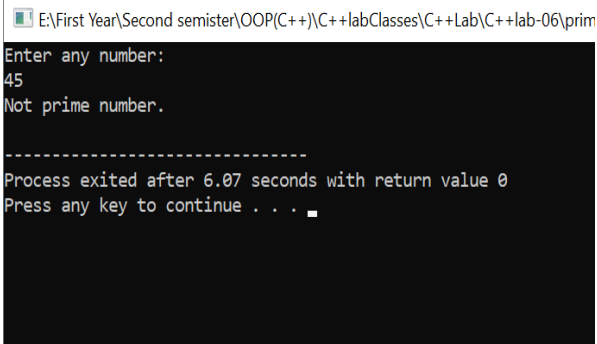
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-06\libraryCard.exe

```
Enter title
Avengers
Enter Author Name
oss Whedon
Enter Number of copies on hand:
5


        this is SU library card
Title:Avengers
Author Name:oss Whedon
Number of copies on hand:5
------------------------------
```

(04)
```cpp
#include<iostream>
using namespace std;
class Prime{
    private:
        int n;
    public:
        void getInput(){
            cout<<"Enter any number:"<<endl;
            cin>>n;
        }
        void calculate(){
            int i,counter=0;
            for(int i=2;i<=n/2;i++){
                if(n%i==0){
                    counter++;
                }
            }
            if(counter==0){
                cout<<"Prime number."<<endl;
            }else{
                cout<<"Not prime number."<<endl;
            }
        }
};
int main(){
    Prime obj;
    obj.getInput();
    obj.calculate();
    return 0;
}
```
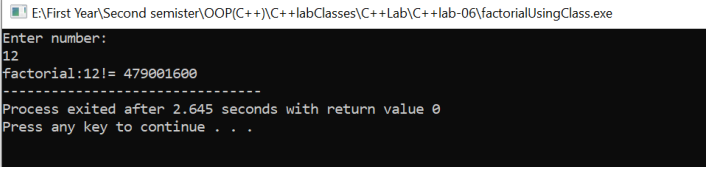
```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-06\prim
Enter any number:
45
Not prime number.

--------------------------------
Process exited after 6.07 seconds with return value 0
Press any key to continue . . .
```

(05)
```cpp
#include<iostream>
using namespace std;
class Factorial{
    private:
        int n;
    public:
        void GetInput(){
            cout<<"Enter number:\n";
            cin>>n;
        }
        void fact(){
            int i,fact=1;
            for(i=1;i<=n;i++){
                fact*=i;
            }
            cout<<"factorial:"<<n<<"!= "<<fact;
        }
};
int main(){
    Factorial obj;
    obj.GetInput();
    obj.fact();
    return 0;
}
```

```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-06\factorialUsingClass.exe
Enter number:
12
factorial:12!= 479001600
--------------------------------
Process exited after 2.645 seconds with return value 0
Press any key to continue . . .
```

Lab class-07 problems:
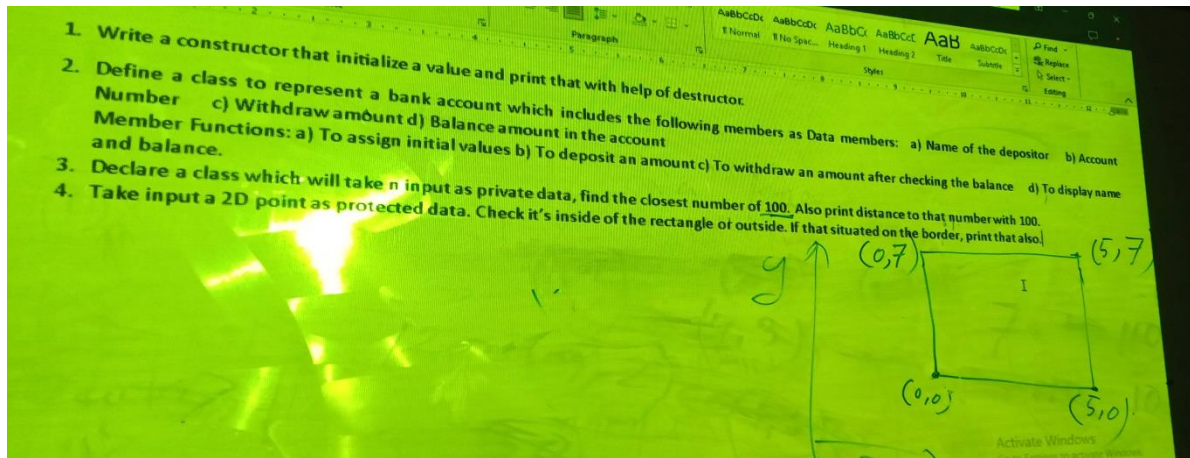
Lab class-07 problems solutions:

(01)
```cpp
#include<iostream>
#include<string>
using namespace std;
class MyClass{//The classs
    private: //Access specifier
        string name; //Attributes
        int id; //Attributes
        public:
        MyClass(string x,int y){ //Parameterized Constructor
                name=x;
                id=y;
        }
            ~MyClass(){//Destructor.
                cout<<"You name:"<<name<<endl;
                cout<<"your ID:"<<id<<endl;
        }
};
int main(){
string name;

    int id;
    cout<<"Enter your name:\n";
    getline(cin,name);
    cout<<"Enter your ID:\n";
    cin>>id;
    MyClass obj(name,id); //Create an object of MyClass and passing arguments.
    return 0;
}
```

(02)

```cpp
#include<iostream>
using namespace std;
class Bank{
    private:
        string nameOfTheDepositor;
        int accountNumber,withdrawalAmount,depositAmount;
        long int Balance=0;
    public:
        void choche(){
            again:
            int choice;
            cout<<"1)To Deposit an Amount.\n";
            cout<<"2)Checking Balance and withdraw an amount.\n";
            cout<<"3)Check name and current balance.\n";
            cout<<"4)Exit\n";
            cout<<"Enter you choice:"<<endl;
            cin>>choice;
            switch(choice){
                case 1:
                    Deposit();
                    break;
                case 2:
                    CheckBAndWithdraw();
                    break;
                case 3:
                    CheckNameAndBalance();
                    break;
                case 4:
                    Exist1();
                    break;
                default:
                    cout<<"Please choose currect option.\n";
            }
            goto again;
        }
        void Deposit(){
            cout<<"Enter your name:\n";
            cin.ignore();
            getline(cin,nameOfTheDepositor);
            // cin>>nameOfTheDepositor;
            cout<<"Enter Account number:\n";
            cin>>accountNumber;
            cout<<"Deposit Amount.\n";
            cin>>depositAmount;
            Balance+=depositAmount;
            cout<<"Your deposit amount added successfully.\n";
        }
        void CheckBAndWithdraw(){
            cout<<"current balance ="<<Balance<<endl;
            cout<<"Enter your withdrawal amount:\n";
            cin>>withdrawalAmount;
            cout<<"With draw successfull\n";
            Balance-=withdrawalAmount;
            cout<<"Current balance:"<<Balance<<endl;
        }
        void CheckNameAndBalance(){
            cout<<"Depositor name:"<<nameOfTheDepositor<<endl;
            cout<<"You balance is:"<<Balance<<endl;

        }
        int Exist1(){
            return 0; }
};
int main(){
    Bank obj;
    obj.choche();
    obj.Deposit();
    obj.CheckNameAndBalance();
    obj.CheckNameAndBalance();
    return 0;
}
```

C:\Users\Rafi Ahmed\Desktop\Untitled1.exe
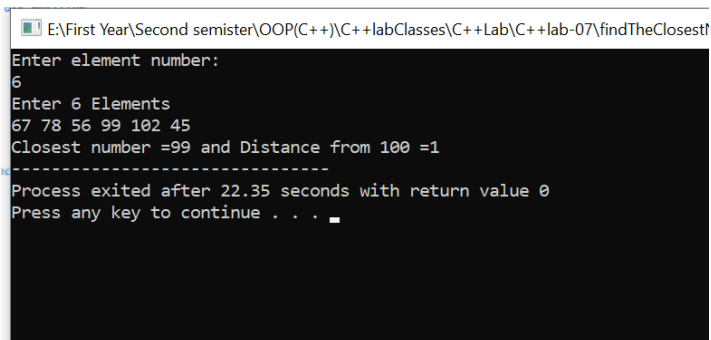
```
Enter your name:
Rafi Ahmed
Enter Account number:
01646628341
Deposit Amount.
6000
Your deposit amount added successfully.
1)To Deposit an Amount.
2)Checking Balance and withdraw an amount.
3)Check name and current balance.
4)Exit
Enter you choice:
2
current balance =6000
Enter your withdrawal amount:
5000
With draw successfull
Current balance:1000
1)To Deposit an Amount.
2)Checking Balance and withdraw an amount.
3)Check name and current balance.
4)Exit
Enter you choice:
3
Depositor name:Rafi Ahmed
You balance is:1000
1)To Deposit an Amount.
2)Checking Balance and withdraw an amount.
3)Check name and current balance.
4)Exit
Enter you choice:
3
Depositor name:Rafi Ahmed
You balance is:1000
1)To Deposit an Amount.
2)Checking Balance and withdraw an amount.
3)Check name and current balance.
4)Exit
Enter you choice:
```

```cpp
(03)
#include<iostream>
using namespace std;
class MathematicalOperation{
    private:
        int n,arr[100],md,mdp,v;//md=minimum distance and mdp min dis position
        public:
            MathematicalOperation(){
                cout<<"Enter element number:\n";
                cin>>n;
                cout<<"Enter "<<n<<" Elements\n";
                for(int i=0;i<n;i++){
                    cin>>arr[i];
                }
                if(arr[0]==100){
                    mdp=0;
                    md=0;
//                  cout<<arr[0]<<"is the cloest of 100 and distance =0\n";
                }else if(arr[0]<100){
                    md=100-arr[0];
                }else{
                    md=arr[0]-100;
                }
                for(int i=1;i<n;i++){
                    v=100-arr[i];
                    if(v<0){
                        v=v*(-1);
                    }
                    if(v<=md){
                        md=v;
                        mdp=i;
                    }
                }

            }
            ~MathematicalOperation(){
                cout<<"Closest number ="<<arr[mdp]<<" and "<<"Distance from 100 ="<<md;
            }
};
int main(){
    MathematicalOperation obj;
    return 0;
}
```
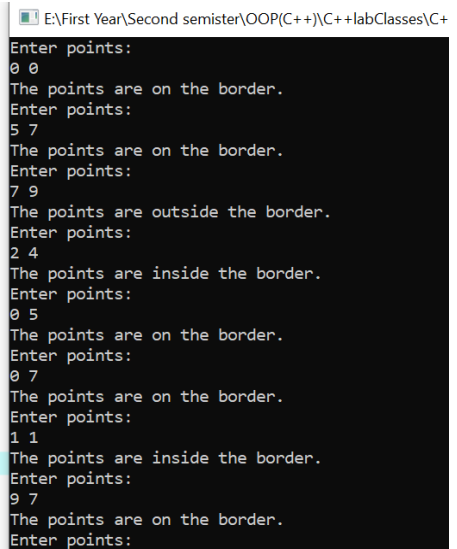
```
■ E:\First Year\Second semister\OOP(C++)\C++labClasses\C++-Lab\C++-lab-07\findTheClosest\
Enter element number:
6
Enter 6 Elements
67 78 56 99 102 45
Closest number =99 and Distance from 100 =1
------------------------------
Process exited after 22.35 seconds with return value 0
Press any key to continue . . . ▪
```

(04)

```cpp
#include<iostream>
using namespace std;
class MathematicalOperation{//The class
    protected: //Access specifier
        int x,y;
        public:
            MathematicalOperation(int x1,int y1){ //Perameterized Constructor
                x=x1;
                y=y1;
                if(x==5 || y==7 || x==0 || y==0){
                    cout<<"The points are on the border.\n";
                }else if(x<5 && y<7){
                    cout<<"The points are inside the border.\n";
                }else{
                    cout<<"The points are outside the border.\n";
                }
            }
};
int main(){
    int x,y;
    while(1){
    cout<<"Enter points:"<<endl;
    cin>>x>>y;
    MathematicalOperation obj(x,y); //Creating an object of MathematicalOperation
    }
    return 0;
}
```
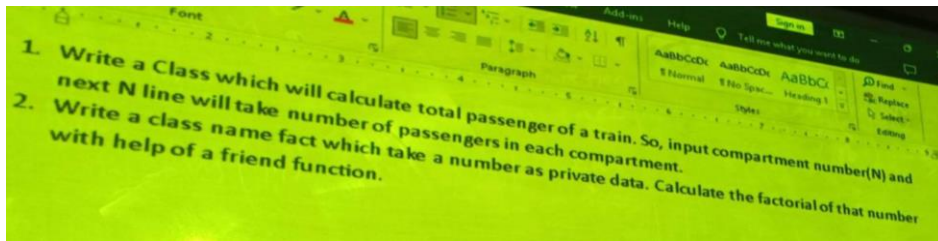
Lab Class-08

1. Write a Class which will calculate total passenger of a train. So, input compartment number(N) and next N line will take number of passengers in each compartment.
2. Write a class name fact which take a number as private data. Calculate the factorial of that number with help of a friend function.

Lab class-08 problems solutions:

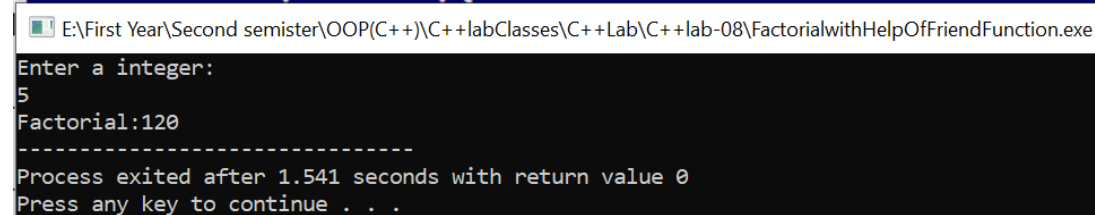(01)Count total passanger of a Train.

```cpp
hello.cpp
#include<iostream>
using namespace std;
class Train{//The class
    private:
        int c,p,i,totalP=0; //Attributes(int variables)
    public:
        void CalculateP(){//user defined function
            cout<<"Enter numbers of compartment:\n";
            cin>>c;
            for(i=1;i<=c;i++){
                cout<<"Enter "<<i<<"th compartment numbers of passangers:\n";
                cin>>p;
                totalP+=p;
            }
        }
        void display(){
            cout<<"Total passanger:"<<totalP;
        }
};
int main(){
    Train obj; //Creating an object of Train.
    obj.CalculateP();
    obj.display();
    return 0;
}
```

```
E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-08\CalculateTheTotalPassangerOfaTrain.exe

Enter numbers of compartment:
5
Enter 1th compartment numbers of passangers:
25
Enter 2th compartment numbers of passangers:
27
Enter 3th compartment numbers of passangers:
30
Enter 4th compartment numbers of passangers:
21
Enter 5th compartment numbers of passangers:
29
Total passanger:132
```

(02)Find Factorial using friend function.

```cpp
#include<iostream>
using namespace std;
class Fact{//The class
    private: //Access specifier
        int n,i,fact=1;
        public: //Access specifier
        Fact(int x){ //Perameterized constructor
            n=x;
        }
        friend int factOfN(Fact ob); //declaration of friend function
};
 int factOfN(Fact ob){ //Defination of friend function
    for(ob.i=1;ob.i<=ob.n;ob.i++){
        ob.fact*=ob.i;
    }
    return ob.fact;
}
int main(){
    int n,f;
    cout<<"Enter a integer:\n";
    cin>>n;
    Fact obj(n); //Creating an object and passing arguments
    cout<<"Factorial:"<<factOfN(obj); //Calling friend function.
    return 0;
}
```

E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-08\FactorialwithHelpOfFriendFunction.exe

```
Enter a integer:
5
Factorial:120
--------------------------------
Process exited after 1.541 seconds with return value 0
Press any key to continue . . .
```

(03)Use of friend function.

```cpp
#include<iostream>
using namespace std;
class MyClass{//The class
    int n1,n2;
    public:
        MyClass(int x,int y){ //Perameterized constructor.
            n1=x;
            n2=y;
        }
        friend int isFactor(MyClass ob); //declaration of friend function.

};
int isFactor(MyClass ob){ //Defination of friend function.
    if(ob.n1%ob.n2==0)
    return 1;
    else
    return 2;
}
int main(){
    int a,b,r;
    cin>>a>>b;
    MyClass obj(a,b); //Creating an object of MyClass
    r=isFactor(obj); //Calling Friend function and passing object.
    if(r==1)
    cout<<a<<" is divided by "<<b<<"\n";
    else
    cout<<a<<" is not divided by "<<b<<"\n";
    return 0;
}
```

E:\First Year\Second semister\OOP(C++)\C++labClasses\C++Lab\C++lab-08\useOfFriendFunction.exe

```
8 4
8 is divided by 4

--------------------------------
Process exited after 4.043 seconds with return value 0
Press any key to continue . . .
```

Conclusion

At the end of the practical work,We have learnt to ..

(1)Creating C++ programs.
 (2)Using function in C++.
(3)Describe OOP's concepts.
(4)Classes and objects in C++.
 (5)Array types and their implementaion
(6) Implementing OOPs Concepts in C++
(7) Constructor and Destructor.

By doing this practical work we have deepen our knowledge about the theory lectures of programming and also we have widen our knowledge of the C++ .