Lab File

Object Oriented Programming Using C++

(ES 203)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Submitted to:

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NOIDA -201301

Exp No	Assignment Category	Code	Name of Experiment	Date of Allotment	Date of Evaluation	Max Marks	Marks Obtained	Faculty Sign
1	Mandatory Experiment		Write a program to check number palindrome.	16-07-2020	30-10-2020			
2			Write a program to show the effect of call by value and call by reference in functions.	23-07-2020	30-10-2020			
3			Write a program to perform following operations on matrix using functions and switch case: (a) Addition (b)subtraction (c) multiplication (d) transpose	30-07-2020	30-10-2020			
4			Define a class Shape whose attributes are radius, length and width calculate the perimeter of the rectangle and circle.	6-08-2020	30-10-2020			
5			Define the methods of the class inside or outside the class declaration. Use the concept of scope resolution operator.	13-08-2020	30-10-2020			
6			Write a program to develop the salary slip and display result by using constructors.	20-08-2020	30-10-2020			
7			Write a program to find the biggest of three numbers using friend function	3-09-2020	30-10-2020			
8			Write a C++ program to implement static data members and static member functions.	10-09-2020	30-10-2020			
9			Write a C++ program to call base class constructors in	17-09-2020	30-10-2020			

			the following forms of inheritance. a) Single Inheritance b) Multiple Inheritance c) Multi level Inheritance d) Hierarchical Inheritance.					
10			Write a program to find the area of circle, rectangle and triangle by Function overloading concept.	24-09-2020	30-10-2020			
11			Write a C++ program that overloads the unary ++ operator to increment each element of the given one - dimensional array by '1'.	1-10-2020	30-10-2020			
12			Write a program to calculate the total mark of a student using the concept of virtual base class.	8-10-2020	30-10-2020			
13			Write a C++ program that to perform various operations on strings handling using string class.	15-10-2020	30-10-2020			
14			Write a C++ program to display the contents of a text file.	22-10-2020	30-10-2020			
15			Write a program to implement stack functions using templates.	29-10-2020	30-10-2020			
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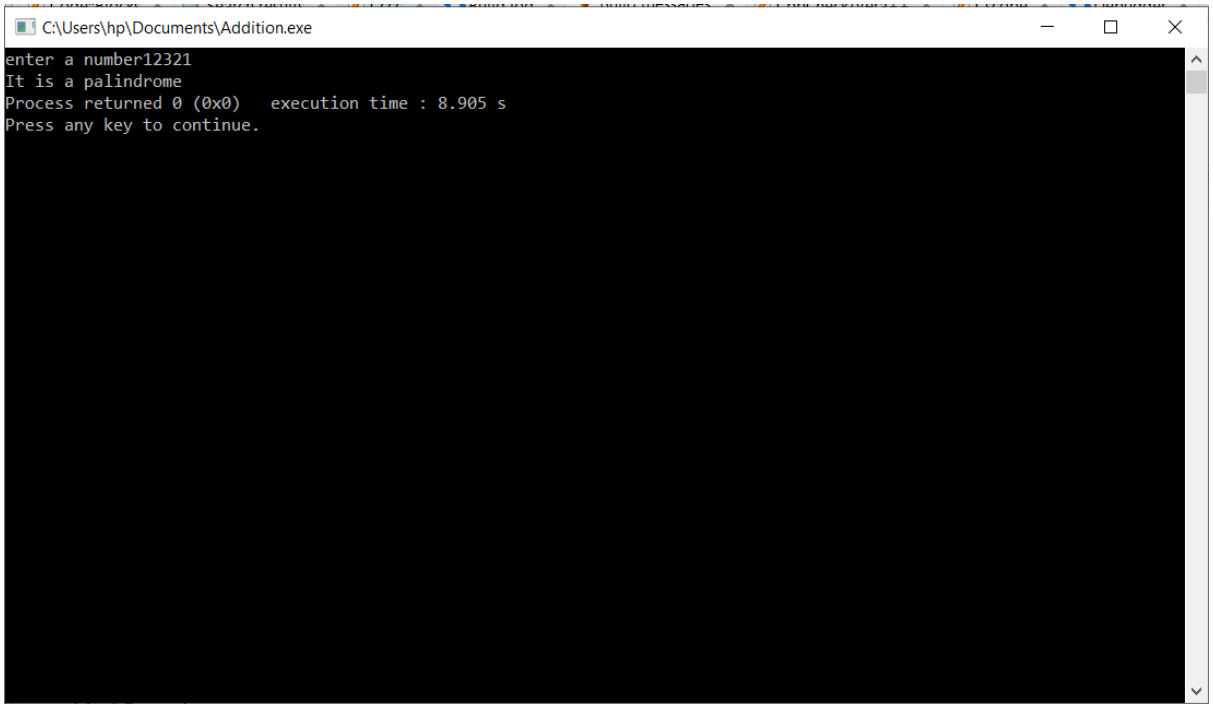
Q1) Write a program to check number palindrome.

Ans)

Code:

```
//Addition.cpp
#include <iostream>
using namespace std;
int main()
{
int n;
int a,r,d=0;
cout<<"enter a number";
cin>>n;
a=n;
while(a>0)
{
r=a%10;
d=d*10+r;
a=a/10;
}
if(n==d)
{
cout<<"It is a palindrome";
}
else
{
cout<<"It is not a palindrome";
}
return 0;
}
```

Output:



Q2) Write a program to show the effect of call by value and call by reference in functions.

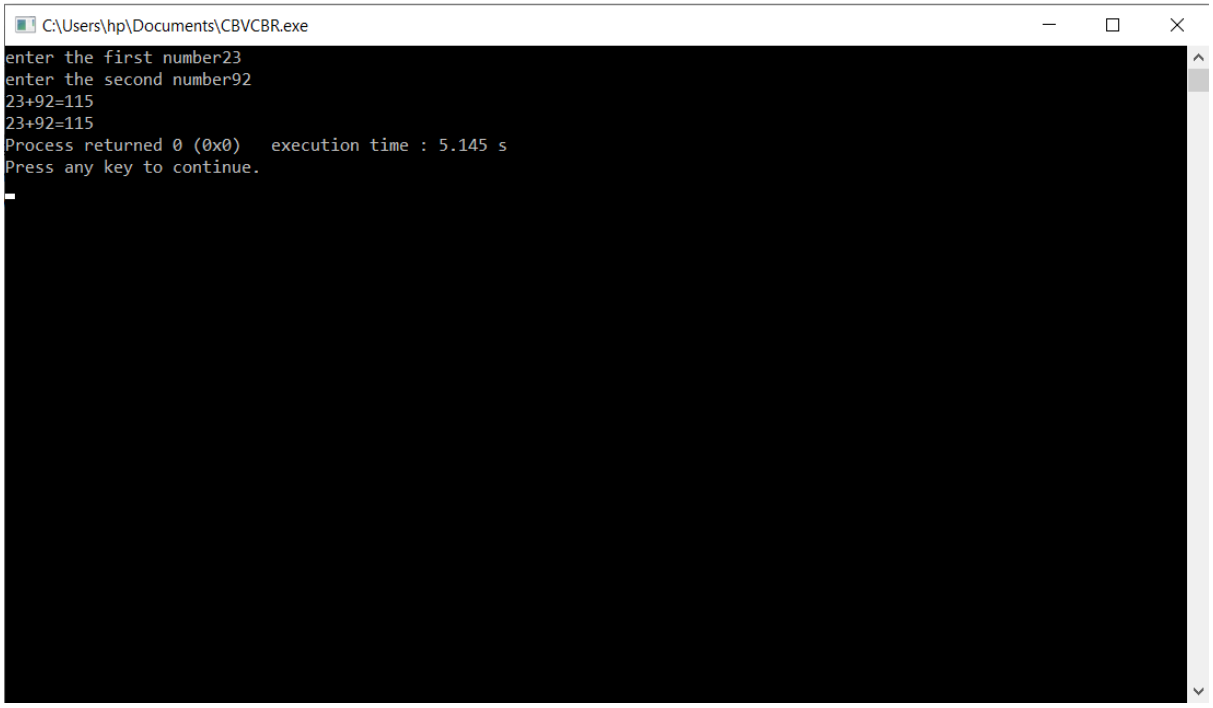
Ans)

Code:

```
//CBVCBR.cpp
#include <iostream>
using namespace std;
int add(int a,int b)//call By Value
{
return a+b;
}
int add(int *a,int *b)//Call By Reference
{
return *a+*b;
}
int main()
{
int a,b,c;
```

```
cout<<"enter the first number";
cin>>a;
cout<<"enter the second number";
cin>>b;
c=add(a,b);//Call By Value
cout<<a<<"+"<<b<<"="<<c<<endl;
c=add(&a,&b);//Call By Reference
cout<<a<<"+"<<b<<"="<<c;
return 0;
}
```

Output:



Q3) Write a program to perform following operations on matrix using functions and switch case:

(a) Addition (b)subtraction (c) multiplication (d) transpose.

Ans)

Code:

```
//Matrix Calculator.cpp
#include<iostream>
```

```
#include<process.h>
using namespace std;
void addmat(int a[][100],int r1,int c1,int b[][100],int c[][100])
{
for(int i=0;i<r1;i++)
{
for(int j=0;j<c1;j++)
{
*(*(c+i)+j)=*(*(b+i)+j)+*(*(a+i)+j);
}
}
}
void submat(int a[][100],int r1,int c1,int b[][100],int c[][100])
{
for(int i=0;i<r1;i++)
{
for(int j=0;j<c1;j++)
{
*(*(c+i)+j)=*(*(b+i)+j)-*(*(a+i)+j);
}
}
}
void multimat(int a[][100],int r1,int b[][100],int c2,int c[][100],int p)
{
for(int i=0;i<r1;i++)
{
for(int j=0;j<c2;j++)
{
int sum=0;
for(int k=0;k<p;k++)
```

```
{
int d=a[i][k]*b[k][j];
sum=sum+d;
}
c[i][j]=sum;
}
}
}
void transpose(int a[][100],int r,int c,int b[][100])
{
for(int i=0;i<r;i++)
{
for(int j=0;j<c;j++)
{
b[i][j]=a[j][i];
}
}
}
int main()
{
int a[100][100],b[100][100],result[100][100];
int r1,r2,c1,c2;
int choice;
while(1)
{
cout<<"Matrix Calculation"<<endl;
cout<<"1.Addition"<<endl;
cout<<"2.Subtraction"<<endl;
cout<<"3.Multiplication"<<endl;
cout<<"4.Transpose"<<endl;
```

```
cout<<"5.Exit"<<endl;
cout<<"Enter your choice: ";
cin>>choice;
switch(choice)
{
case 1:  cout<<"Enter the number of rows of  matrix 1: ";
cin>>r1;
cout<<"Enter the number of columns of matrix 1: ";
cin>>c1;
cout<<"Enter the number of rows of  matrix 2: ";
cin>>r2;
cout<<"Enter the number of columns of matrix 2: ";
cin>>c2;
if(r1!=r2 || c1!=c2)
{
cout<<"The matrix addition is not possible."<<endl;
continue;
}
cout<<"Enter the elements of matrix 1: ";
for(int i=0;i<r1;i++)
{
for(int j=0;j<c1;j++)
{
cin>>a[i][j];
}
}
cout<<"Enter the elements of matrix 2: ";
for(int i=0;i<r2;i++)
{
for(int j=0;j<c2;j++)
```

```
{
cin>>b[i][j];
}
}
cout<<"The matrix sum is: "<<endl;
addmat(a,r1,c1,b,result);
for(int i=0;i<r1;i++)
{
for(int j=0;j<c1;j++)
{
cout<<result[i][j]<<" ";
}
cout<<endl;
}
break;
case 2:  cout<<"Enter the number of rows of  matrix 1: ";
cin>>r1;
cout<<"Enter the number of columns of matrix 1: ";
cin>>c1;
cout<<"Enter the number of rows of  matrix 2: ";
cin>>r2;
cout<<"Enter the number of columns of matrix 2: ";
cin>>c2;
if(r1!=r2 || c1!=c2)
{
cout<<"The matrix subtraction is not possible."<<endl;
continue;
}
cout<<"Enter the elements of matrix 1: ";
for(int i=0;i<r1;i++)
```

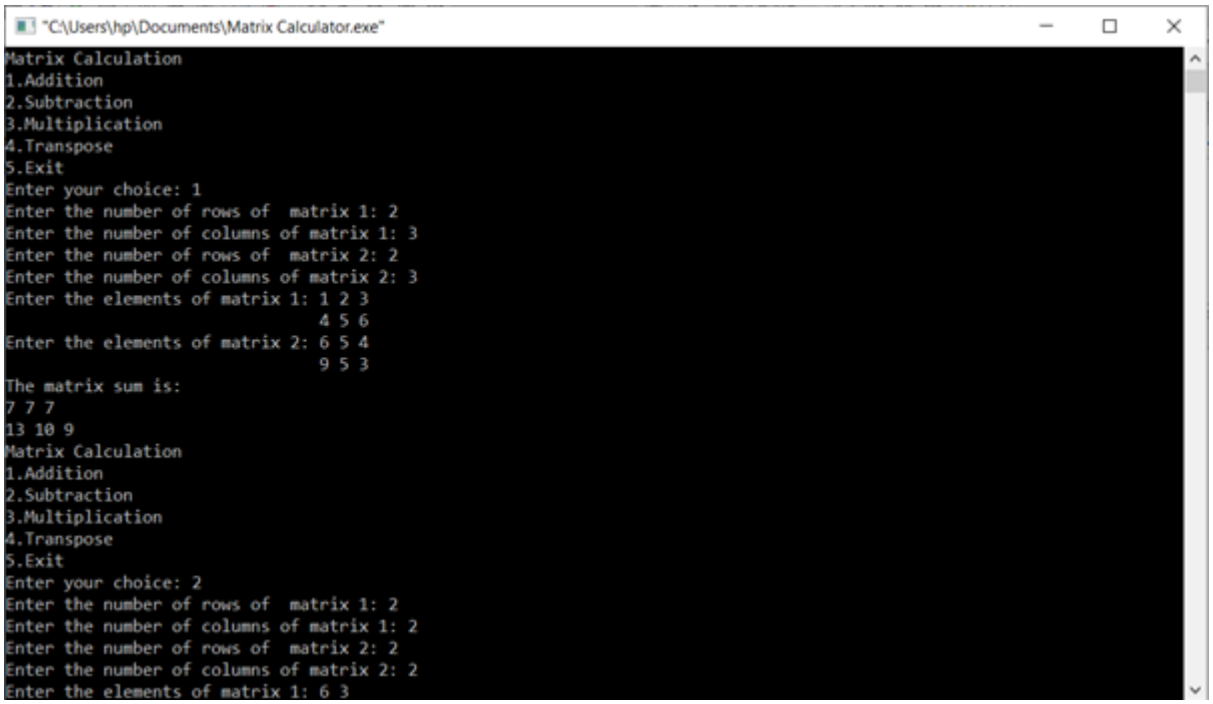
```
{
for(int j=0;j<c1;j++)
{
cin>>a[i][j];
}
}
cout<<"Enter the elements of matrix 2: ";
for(int i=0;i<r2;i++)
{
for(int j=0;j<c2;j++)
{
cin>>b[i][j];
}
}
cout<<"The matrix difference is: "<<endl;
submat(a,r1,c1,b,result);
for(int i=0;i<r1;i++)
{
for(int j=0;j<c1;j++)
{
cout<<result[i][j]<<" ";
}
cout<<endl;
}
break;
case 3:  cout<<"Enter the number of rows of  matrix 1: ";
cin>>r1;
cout<<"Enter the number of columns of matrix 1: ";
cin>>c1;
cout<<"Enter the number of rows of  matrix 2: ";
```

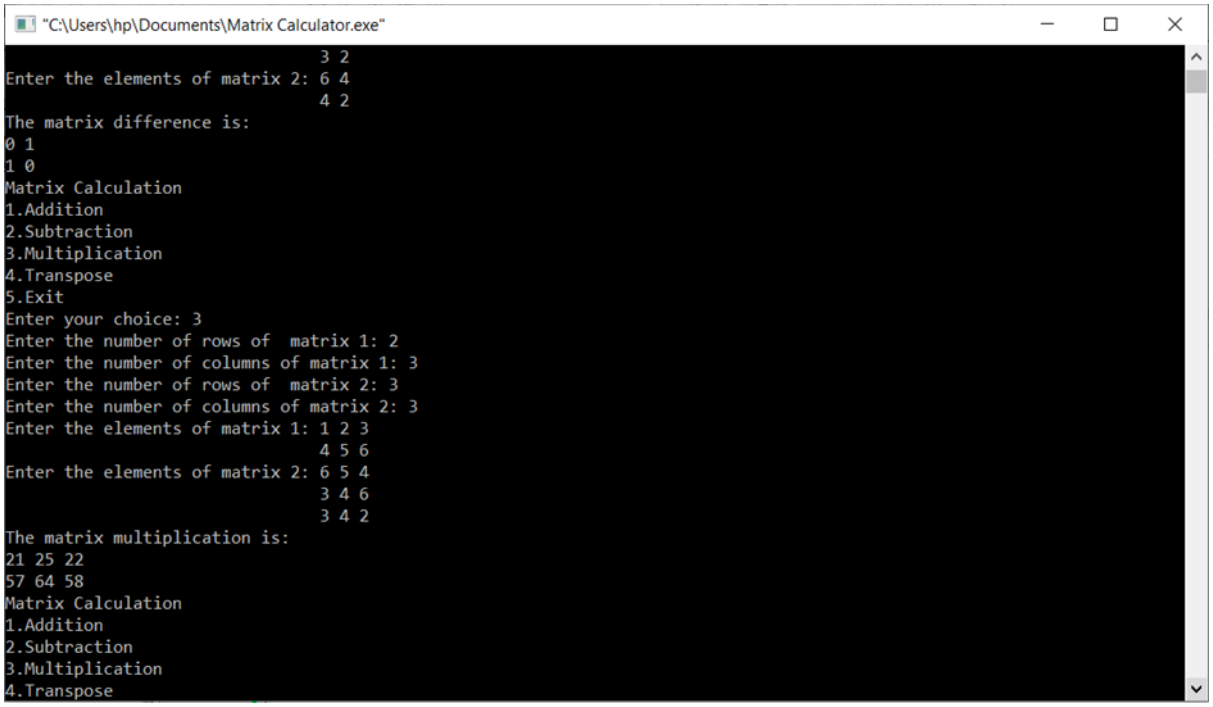
```
cin>>r2;
cout<<"Enter the number of columns of matrix 2: ";
cin>>c2;
if(c1!=r2)
{
cout<<"The matrix multiplication is not possible."<<endl;
continue;
}
cout<<"Enter the elements of matrix 1: ";
for(int i=0;i<r1;i++)
{
for(int j=0;j<c1;j++)
{
cin>>a[i][j];
}
}
multimat(a,r1,b,c2,result,c1);
cout<<"Enter the elements of matrix 2: ";
for(int i=0;i<r2;i++)
{
for(int j=0;j<c2;j++)
{
cin>>b[i][j];
}
}
cout<<"The matrix multiplication is: "<<endl;
multimat(a,r1,b,c2,result,c1);
for(int i=0;i<r1;i++)
{
for(int j=0;j<c2;j++)
```

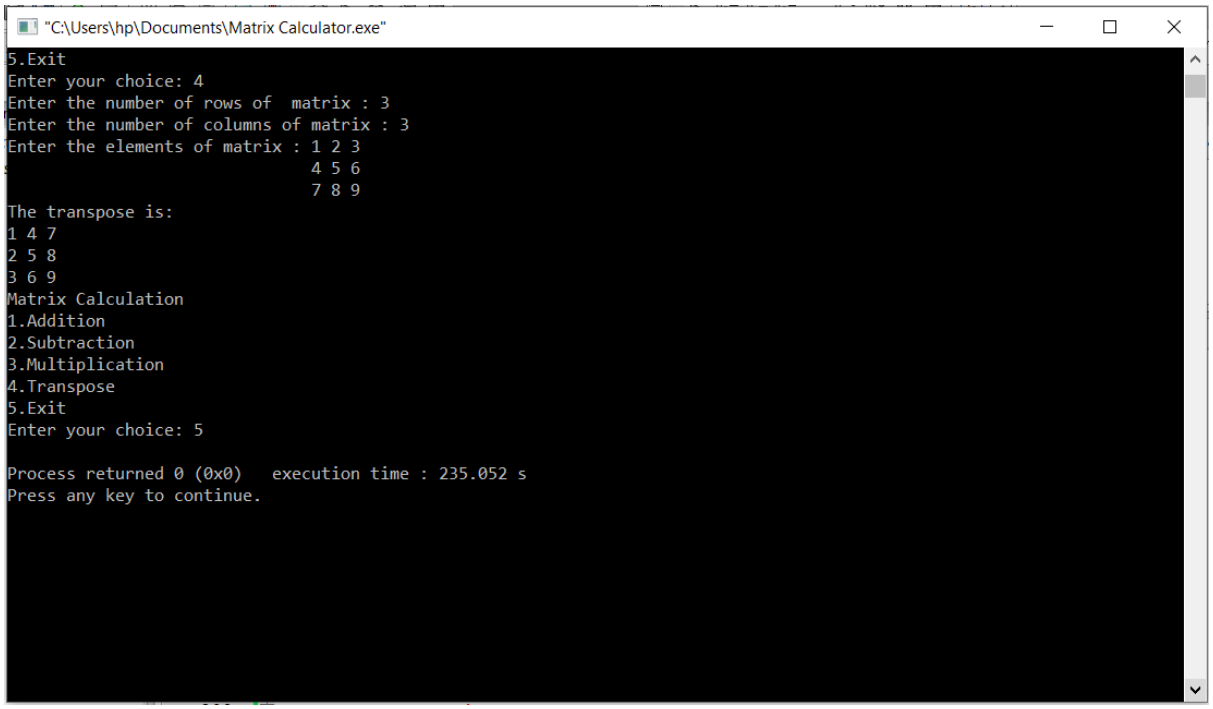
```
{
cout<<result[i][j]<<" ";
}
cout<<endl;
}
break;
case 4:  cout<<"Enter the number of rows of  matrix : ";
cin>>r1;
cout<<"Enter the number of columns of matrix : ";
cin>>c1;
cout<<"Enter the elements of matrix : ";
if(r1!=c1)
{
cout<<"The Transpose of a matrix is not possible"<<endl;
continue;
}
for(int i=0;i<r1;i++)
{
for(int j=0;j<c1;j++)
{
cin>>a[i][j];
}
}
cout<<"The transpose is: "<<endl;
transpose(a,r1,c1,b);
for(int i=0;i<r1;i++)
{
for(int j=0;j<c1;j++)
{
cout<<b[i][j]<<" ";
```

```
}
cout<<endl;
}
break;
case 5: exit(0);
}
}
}
```

Output:







Q4) Define a class Shape whose attributes are radius, length and width calculate the perimeter of the rectangle and circle.

Ans)

Code:

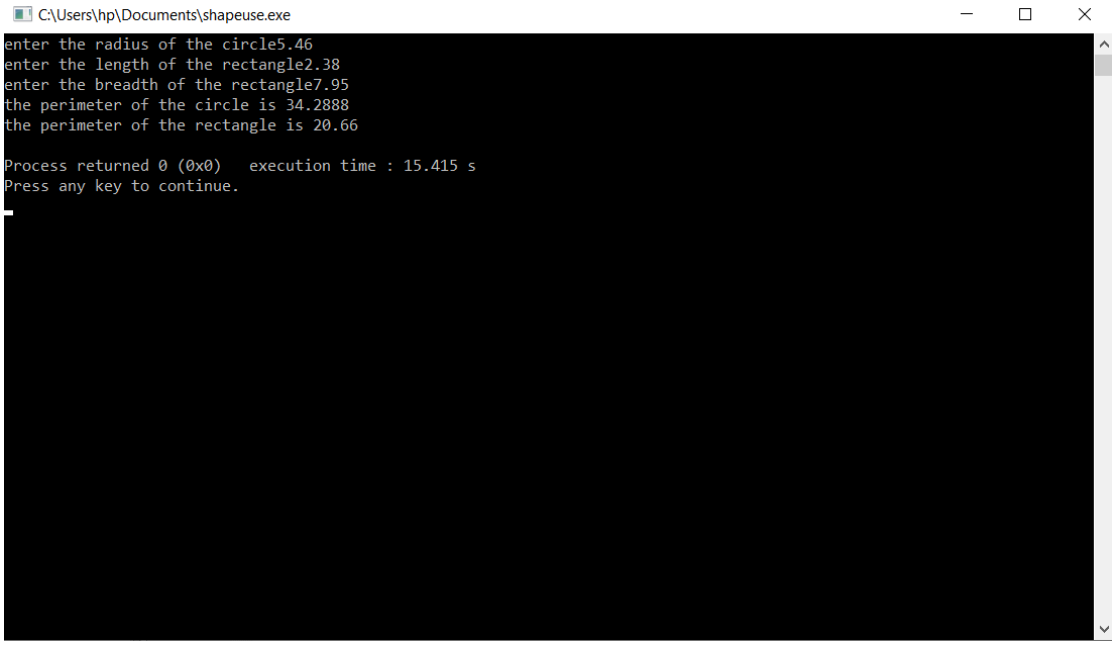
//shape.cpp

#define pi 3.14

```
template <typename T>
class shape
{
T radius;
T length;
T breadth;
public:
shape(T radius,T length,T breadth)
{
this->radius=radius;
this->length=length;
this->breadth=breadth;
}
T cperimeter()
{
return 2*pi*radius;
}
T rperimeter()
{
return 2*(length+breadth);
}
~shape()
{}
};
//shapeuse.cpp
#include <iostream>
using namespace std;
#include "shape.cpp"
int main()
{
```

```
float r,l,b;
cout<<"enter the radius of the circle";
cin>>r;
cout<<"enter the length of the rectangle";
cin>>l;
cout<<"enter the breadth of the rectangle";
cin>>b;
shape <float> s(r,l,b);
cout<<"the perimeter of the circle is"<<" "<<s.cperimeter()<<endl;
cout<<"the perimeter of the rectangle is"<<" "<<s.rperimeter()<<endl;
return 0;
}
```

Output:



Q5) Define the methods of the class inside or outside the class declaration. Use the concept of scope resolution operator.

Ans)

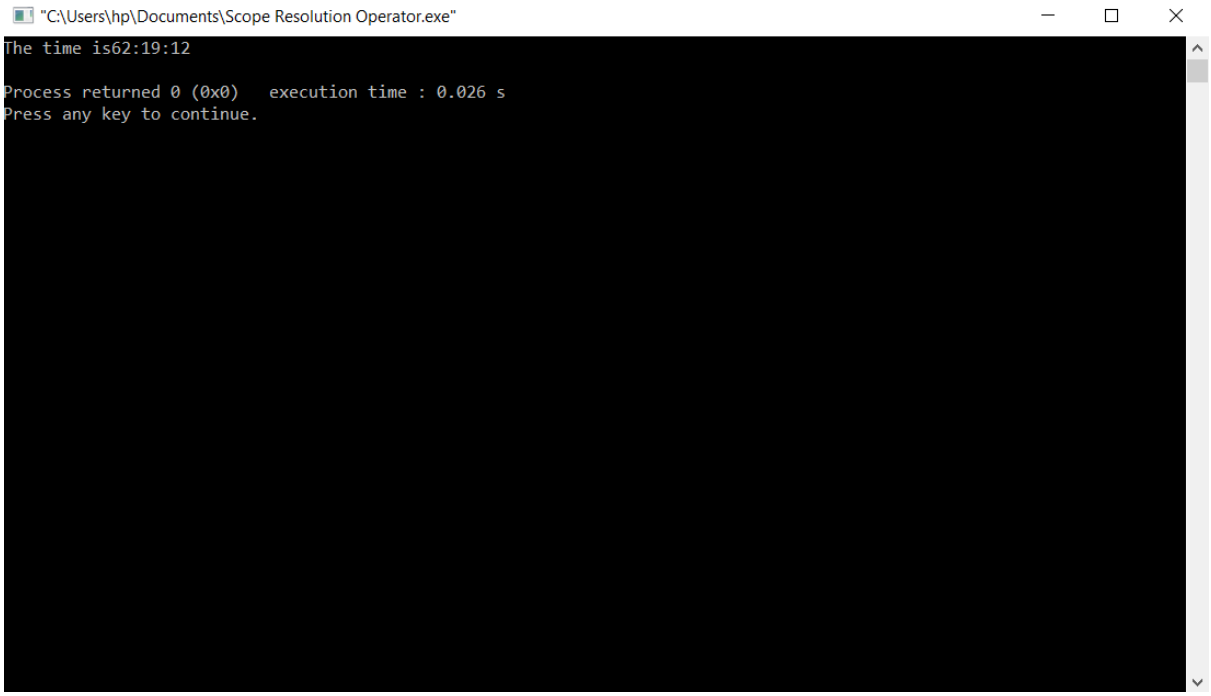
Code:

```
//Scope Resolution Operator.cpp
#include<iostream>
```

```
using namespace std;
class Time
{
int hours, minutes, seconds;
public:
Time(): hours(00), minutes(00), seconds(00)//Constructor overloading
{}//constructor1
Time(int h,int m,int s): hours(h), minutes(m), seconds(s)//Constructor overloading
{}//constructor2
void addtime(Time,Time);
void showtime()
{
cout<<"The time is"<<hours<<":"<<minutes<<":"<<seconds<<endl;
}
};
void Time::addtime(Time t1, Time t2)//Passing objects of the class Time as the function arguments
{
seconds=t1.seconds+t2.seconds;
while(seconds>=60)
{
seconds-=60;
minutes++;
}
minutes+=t1.minutes+t2.minutes;
while(minutes>=60)
{
minutes-=60;
hours++;
}
hours+=t1.hours+t2.hours;
```

```
}
int main()
{
Time t1(45,23,89);//calling constructor 2
Time t2(15,114,43);//calling constructor 2
Time t3;//calling constructor 1
t3.addtime(t1,t2);
t3.showtime();
}
```

Output:



Q6) Write a program to develop the salary slip and display result by using constructors.

Ans)

Code:

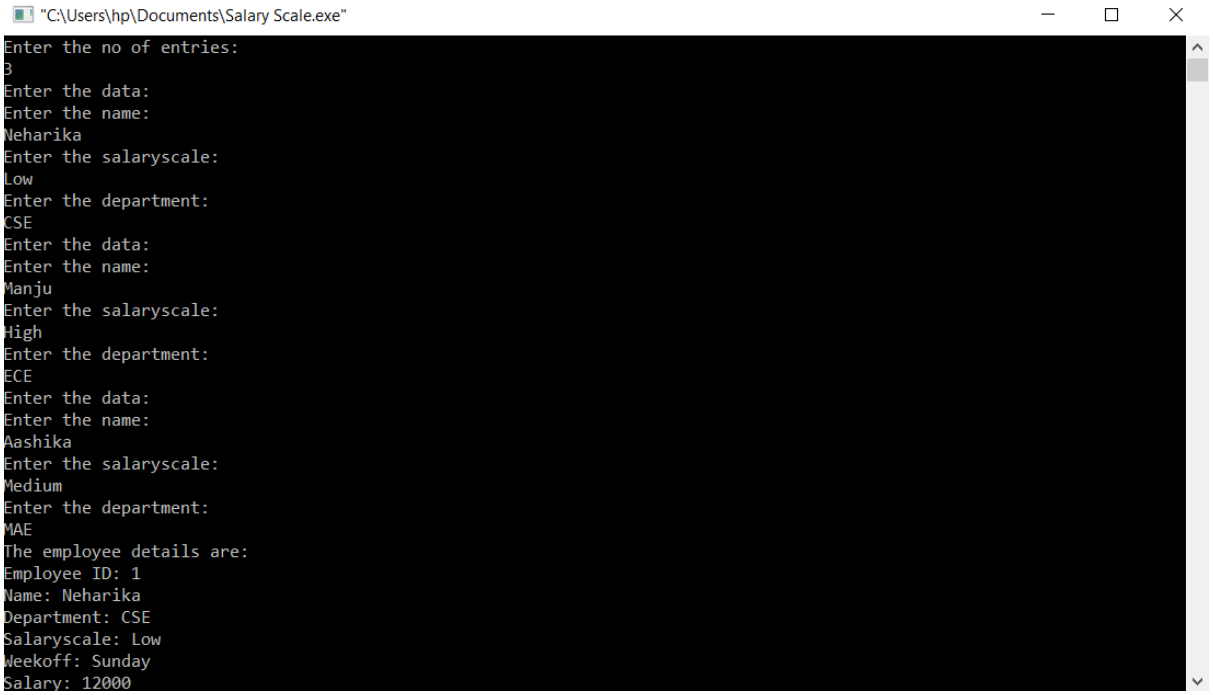
```
//Salary Scale.cpp
#include<iostream>
#include <string>
using namespace std;
class employee
```

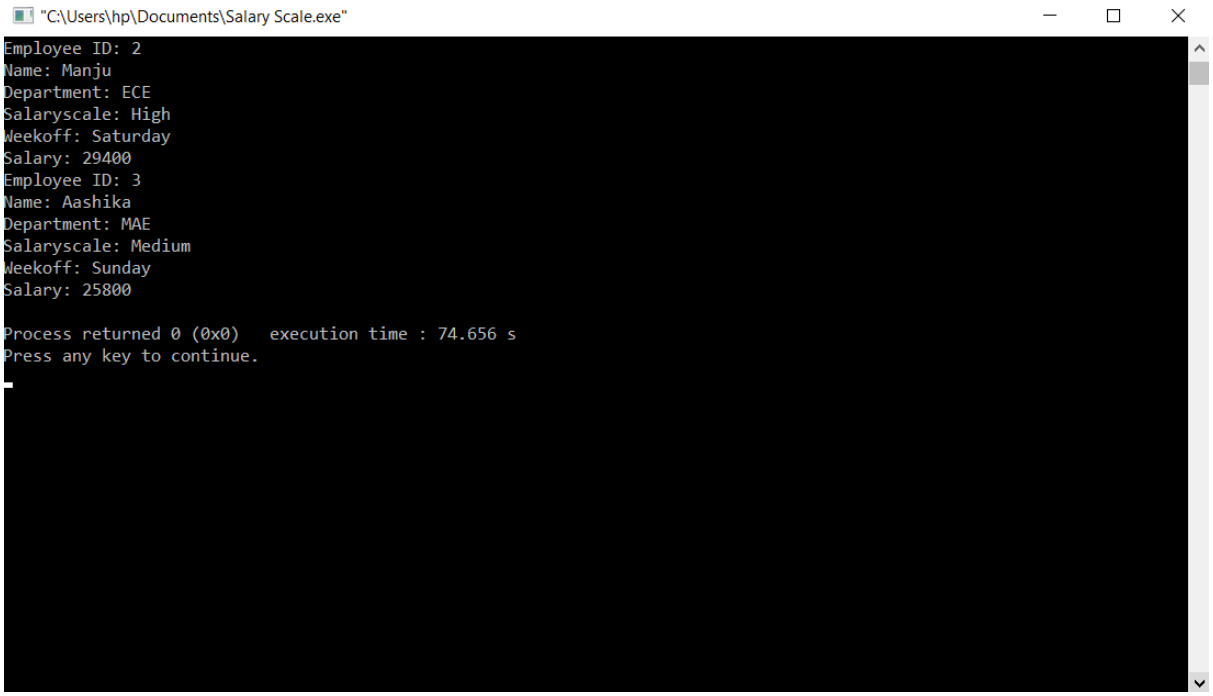
```
{
string name;
string ss;
float basic;
string dept;
string wf;
float salary;
public:
int id;
employee(): name("Unknown Employee"), ss("Low"), basic(12000.00), dept("Nil"), wf("All Days"), salary(0.00), id(0)
{}
void inputdetails()
{
cout<<"Enter the name: "<<endl;
cin>>name;
cout<<"Enter the salaryscale: "<<endl;
cin>>ss;
cout<<"Enter the department: "<<endl;
cin>>dept;
}
string weekoff()
{
if(id%2==0)
{
wf="Saturday";
}
else
{
wf="Sunday";
}
```

```
return wf;
}
float  computesalary()
{
float da,hra;
if(ss=="High")
{
da=basic*0.25;
hra=basic*1.20;
salary=da+hra+basic;
}
else if(ss=="Medium")
{
da=basic*0.15;
hra=basic*1;
salary=da+hra+basic;
}
else
{
salary=basic;
}
return salary;
}
void displaydetails()
{
cout<<"Employee ID: "<<id<<endl;
cout<<"Name: "<<name<<endl;
cout<<"Department: "<<dept<<endl;
cout<<"Salaryscale: "<<ss<<endl;
cout<<"Weekoff: "<<weekoff()<<endl;
```

```
cout<<"Salary: "<<computesalary()<<endl;
}
};
int main()
{
employee e[100];
int entries;
cout<<"Enter the no of entries: "<<endl;
cin>>entries;
for(int i=0;i<entries;i++)
{
cout<<"Enter the data:"<<endl;
e[i].id=i+1;
e[i].inputdetails();
}
cout<<"The employee details are:"<<endl;
for(int i=0;i<entries;i++)
{
e[i].displaydetails();
}
}
```

Output:


"C:\Users\hp\Documents\Salary Scale.exe"
Enter the no of entries:
3
Enter the data:
Enter the name:
Neharika
Enter the salaryscale:
Low
Enter the department:
CSE
Enter the data:
Enter the name:
Manju
Enter the salaryscale:
High
Enter the department:
ECE
Enter the data:
Enter the name:
Aashika
Enter the salaryscale:
Medium
Enter the department:
MAE
The employee details are:
Employee ID: 1
Name: Neharika
Department: CSE
Salaryscale: Low
Weekoff: Sunday
Salary: 12000


"C:\Users\hp\Documents\Salary Scale.exe"
Employee ID: 2
Name: Manju
Department: ECE
Salaryscale: High
Weekoff: Saturday
Salary: 29400
Employee ID: 3
Name: Aashika
Department: MAE
Salaryscale: Medium
Weekoff: Sunday
Salary: 25800
Process returned 0 (0x0) execution time : 74.656 s
Press any key to continue.

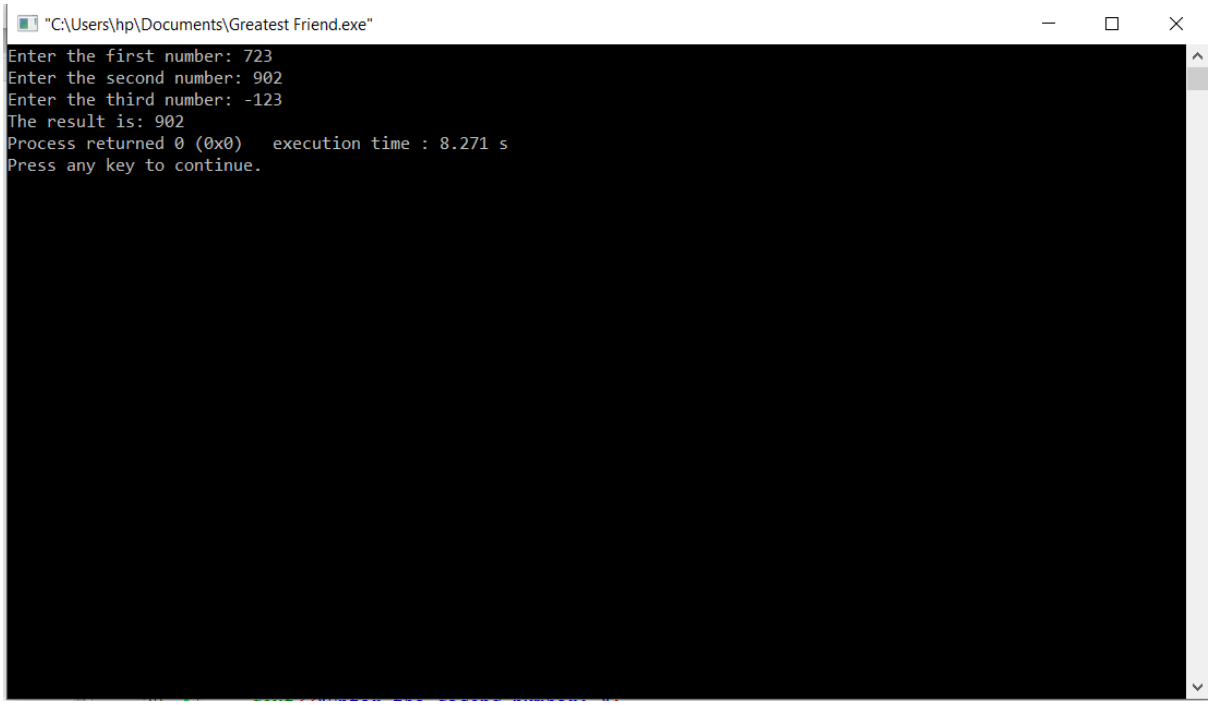
Q7) Write a program to find the biggest of three numbers using friend function

Ans)

Code:

```
//Greatest Friend.cpp
#include <iostream>
using namespace std;
class highest
{
int A,B,C;
public:
highest(int a, int b,int c): A(a), B(b), C(c)
{}
friend int greatest (highest);
};
int greatest(highest h)
{
return ((h.A>=h.B && h.A>=h.C)? h.A: ((h.B>=h.A && h.B>=h.C)? h.B: h.C));
}
int main()
{
int a,b,c;
cout<<"Enter the first number: ";
cin>>a;
cout<<"Enter the second number: ";
cin>>b;
cout<<"Enter the third number: ";
cin>>c;
highest h(a,b,c);
cout<<"The result is: "<<greatest(h);
return 0;
```

Output:



Q8) Write a C++ program to implement static data members and static member functions.

Ans)

Code:

```
//SDMSMF.cpp
#include<iostream>
#include<string>
using namespace std;
class Student
{
string Name;
string RollNo;
int Mathematics,Physics,Chemistry,Result;
public:
//Static Data Member
static int total;
Student()
```

```
{
Name="NoName";
RollNo="S00";
Mathematics=0;
Physics=0;
Chemistry=0;
Result=0;
}
void Input()
{
cout<<"Enter the Name: ";
cin>>Name;
cout<<"Enter the Roll No: ";
cin>>RollNo;
cout<<"Enter the marks of Mathematics: ";
cin>>Mathematics;
cout<<"Enter the marks of Physics: ";
cin>>Physics;
cout<<"Enter the marks of Chemistry: ";
cin>>Chemistry;
}
//Static Member Function
static void ShowTotal()
{
cout<<"The total no of students are: "<<total<<endl;
}
void Display()
{
Result=Mathematics+Physics+Chemistry;
cout<<"Name: "<<Name<<endl;
```

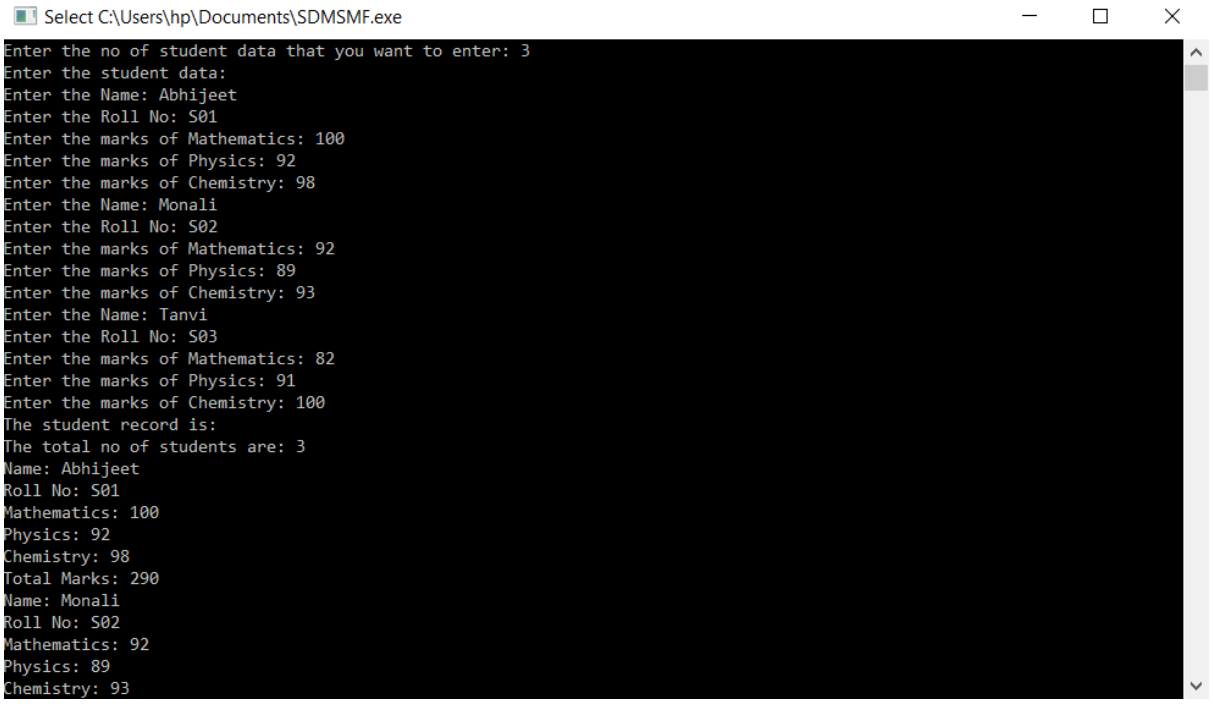
```
cout<<"Roll No: "<<RollNo<<endl;
cout<<"Mathematics: "<<Mathematics<<endl;
cout<<"Physics: "<<Physics<<endl;
cout<<"Chemistry: "<<Chemistry<<endl;
cout<<"Total Marks: "<<Result<<endl;
}
~Student()
{}
};
//Initialization of Static Function
int Student::total=0;
int main()
{
Student s[100];
int n;
cout<<"Enter the no of student data that you want to enter: ";
cin>>n;
cout<<"Enter the student data:"<<endl;
for(int i=0;i<n;i++)
{
s[i].Input();
//Declaration of Static Data Member in the main() Function
Student::total++;
}
cout<<"The student record is:"<<endl;
//Calling of Static Function
Student::ShowTotal();
for(int i=0;i<n;i++)
{
s[i].Display();
```

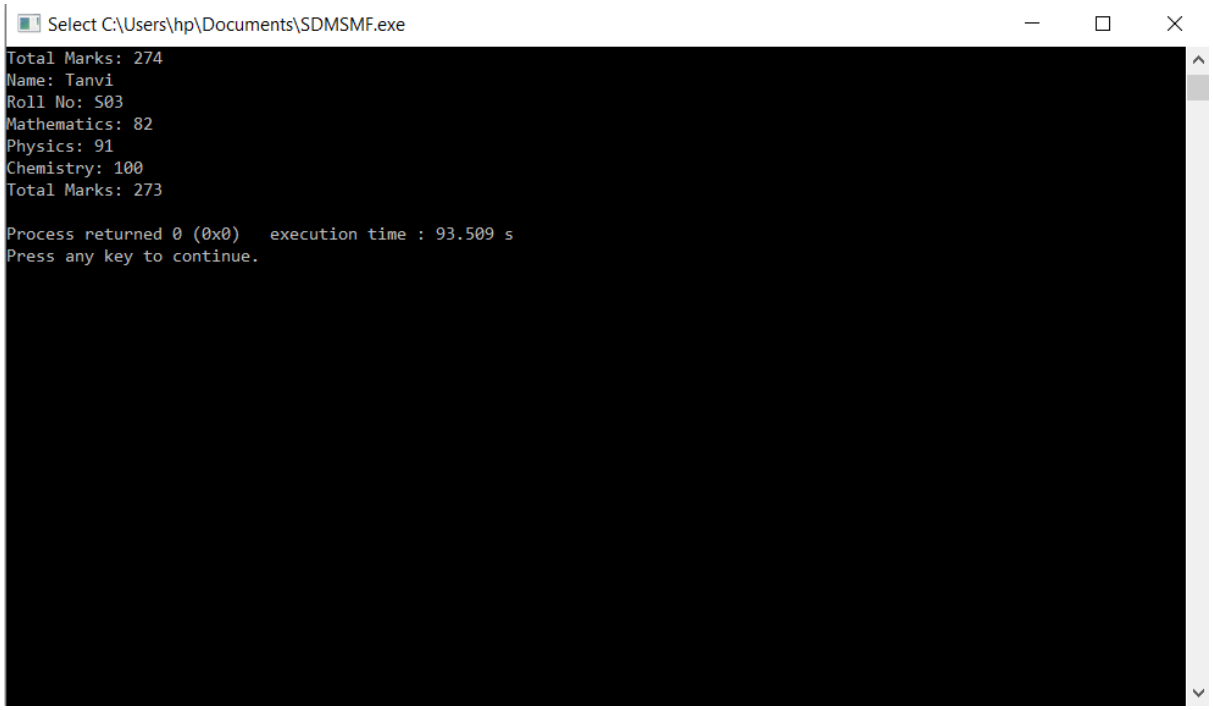
}

return 0;

}

Output:





Q9) Write a C++ program to call base class constructors in the following forms of inheritance.

a) Single Inheritance b) Multiple Inheritance c) Multi level Inheritance d) Hierarchical Inheritance

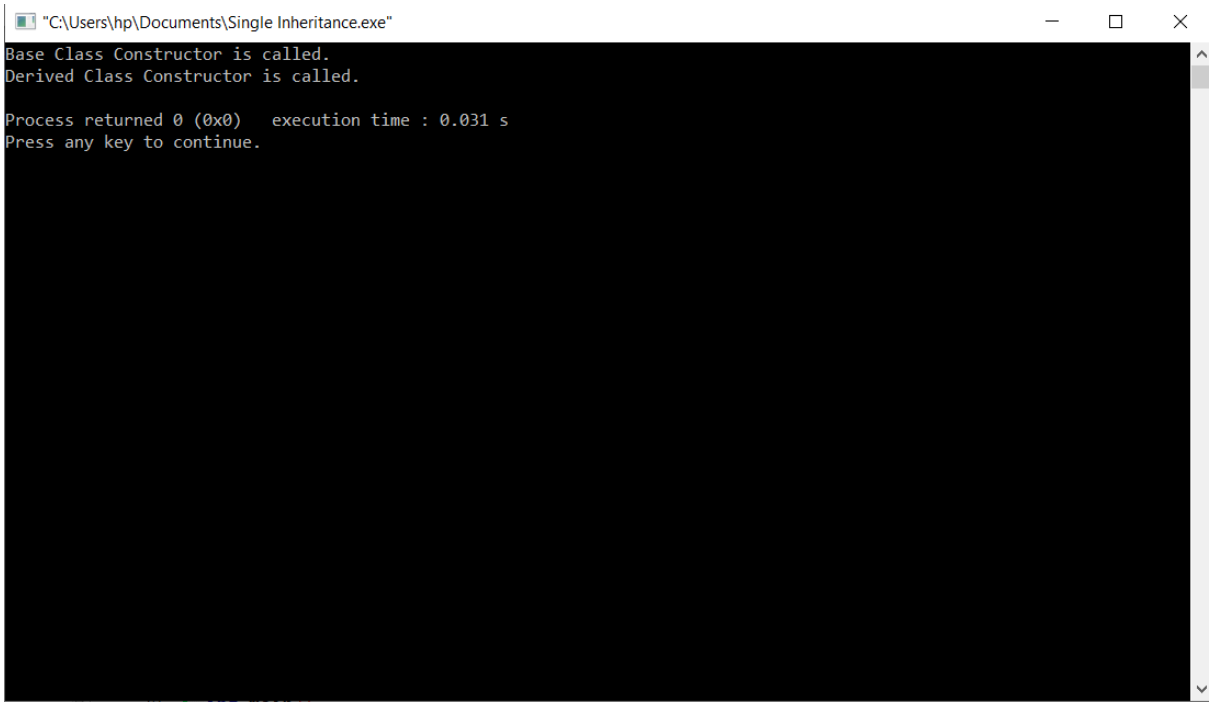
Ans)

(a)

Code:

```
//Single Inheritance.cpp
#include<iostream>
using namespace std;
class Base
{
public:
Base()
{
cout<<"Base Class Constructor is called."<<endl;
}
};
class Derived: public Base
{
public:
Derived()
{
cout<<"Derived Class Constructor is called."<<endl;
}
};
int main()
{
Derived d;
}
```

Output:



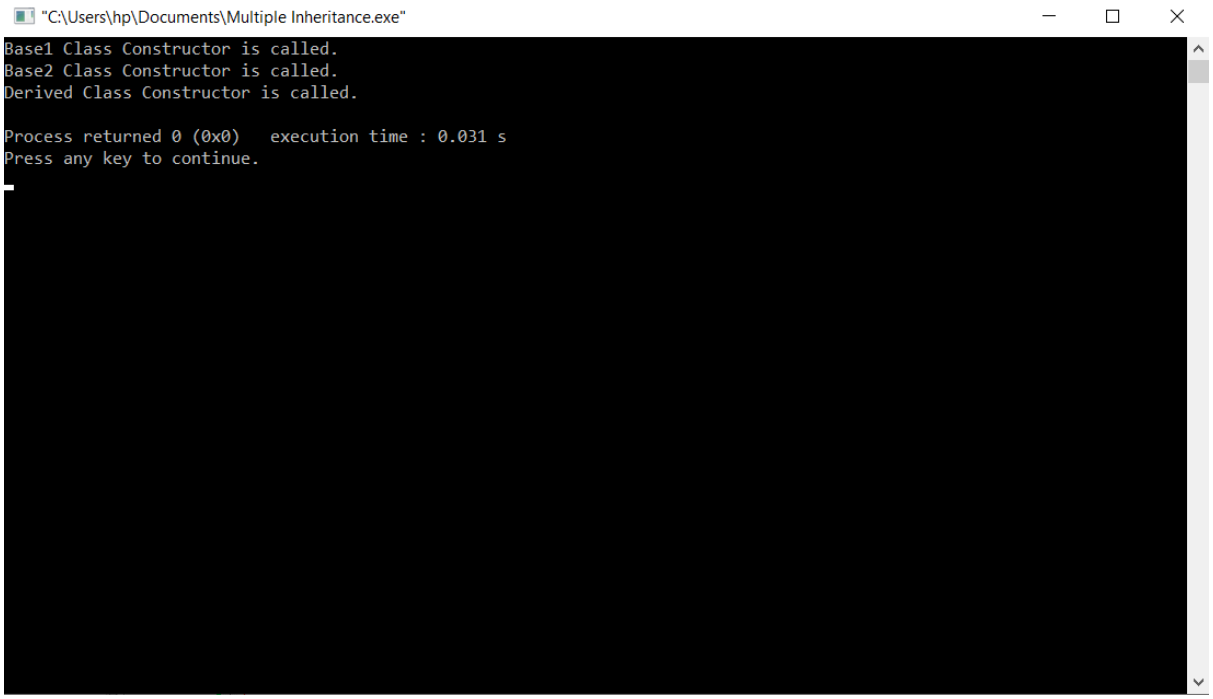
(b)

Code:

```
//Multiple Inheritance.cpp
#include<iostream>
using namespace std;
class Base1
{
public:
Base1()
{
cout<<"Base1 Class Constructor is called."<<endl;
}
};
class Base2
{
public:
Base2()
{
```

```
cout<<"Base2 Class Constructor is called."<<endl;
}
};
class Derived: public Base1, public Base2
{
public:
Derived()
{
cout<<"Derived Class Constructor is called."<<endl;
}
};
int main()
{
Derived d;
}
```

Output:



(c)

Code:

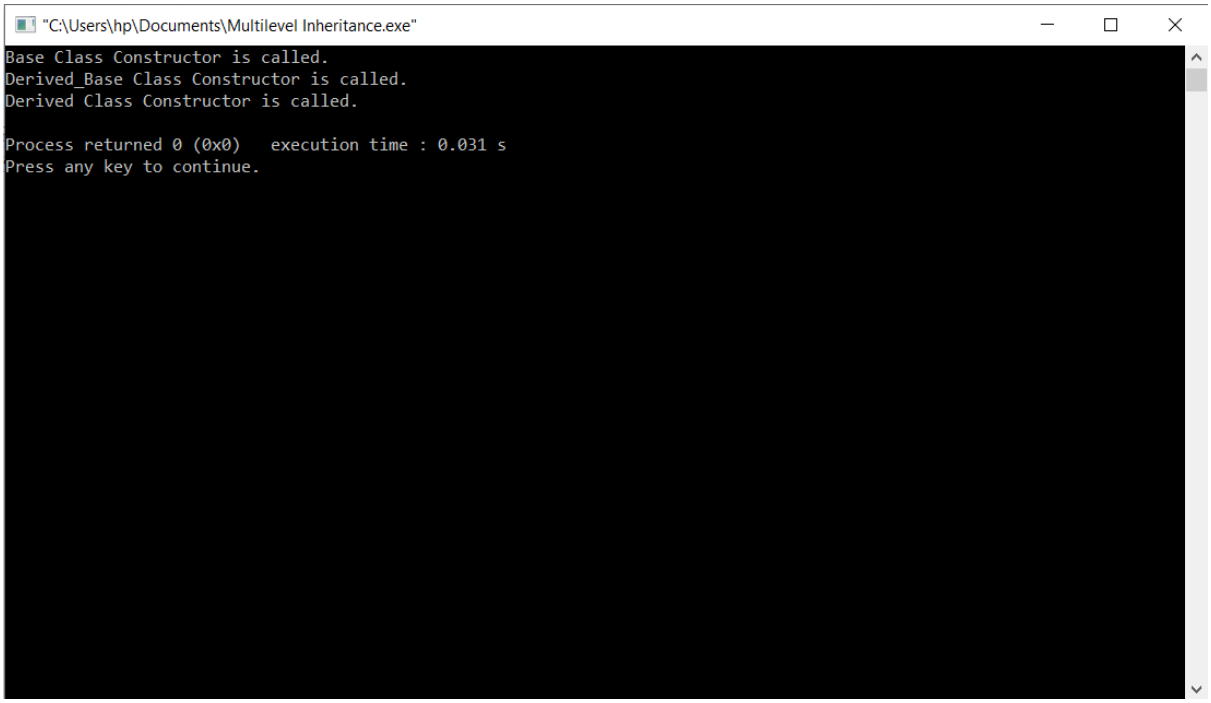
```
//Multilevel Inheritance.cpp
#include<iostream>
using namespace std;
class Base
{
public:
Base()
{
cout<<"Base Class Constructor is called."<<endl;
}
};
class Derived_Base: public Base
{
public:
Derived_Base()
{
cout<<"Derived_Base Class Constructor is called."<<endl;
}
};
class Derived: public Derived_Base
{
public:
Derived()
{
cout<<"Derived Class Constructor is called."<<endl;
}
};
int main()
```

{

Derived d;

}

Output:



(d)

Code:

//Hierarchical Inheritance.cpp

#include<iostream>

using namespace std;

class Base

{

public:

Base()

{

cout<<"Base Class Constructor is called."<<endl;

}

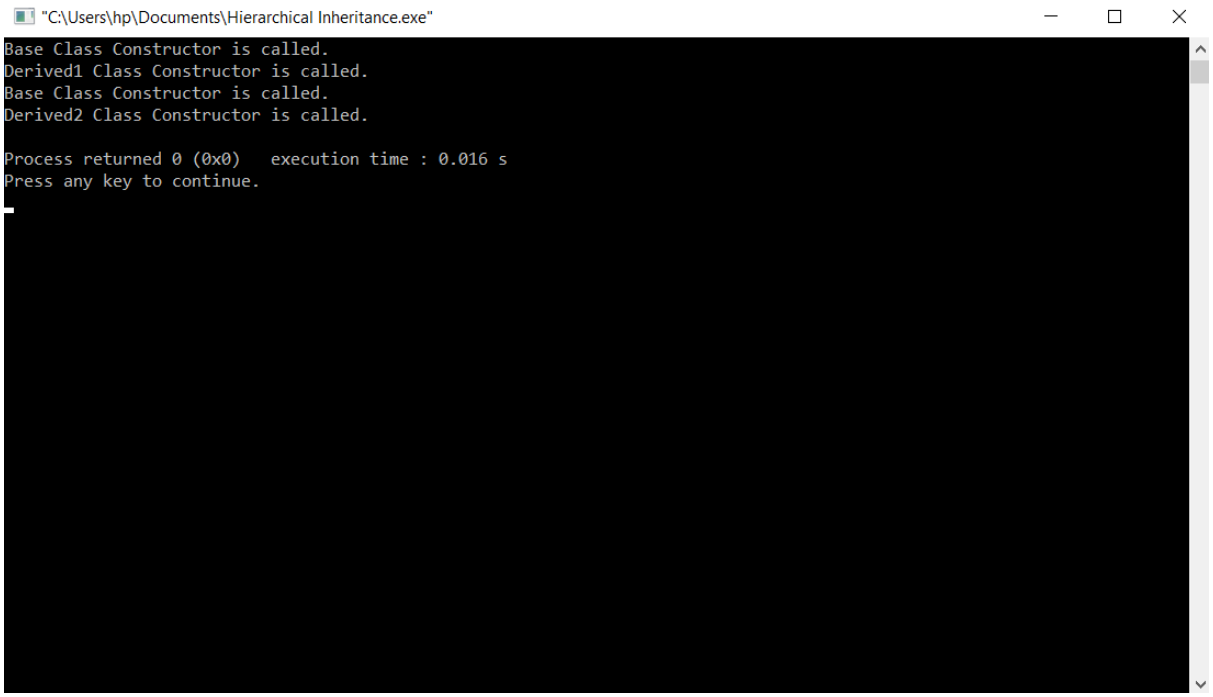
};

class Derived1: public Base

{

```
public:
Derived1()
{
cout<<"Derived1 Class Constructor is called."<<endl;
}
};
class Derived2: public Base
{
public:
Derived2()
{
cout<<"Derived2 Class Constructor is called."<<endl;
}
};
int main()
{
Derived1 d1;
Derived2 d2;
}
```

Output:



Q10) Write a program to find the area of circle, rectangle and triangle by Function overloading concept.

Ans)

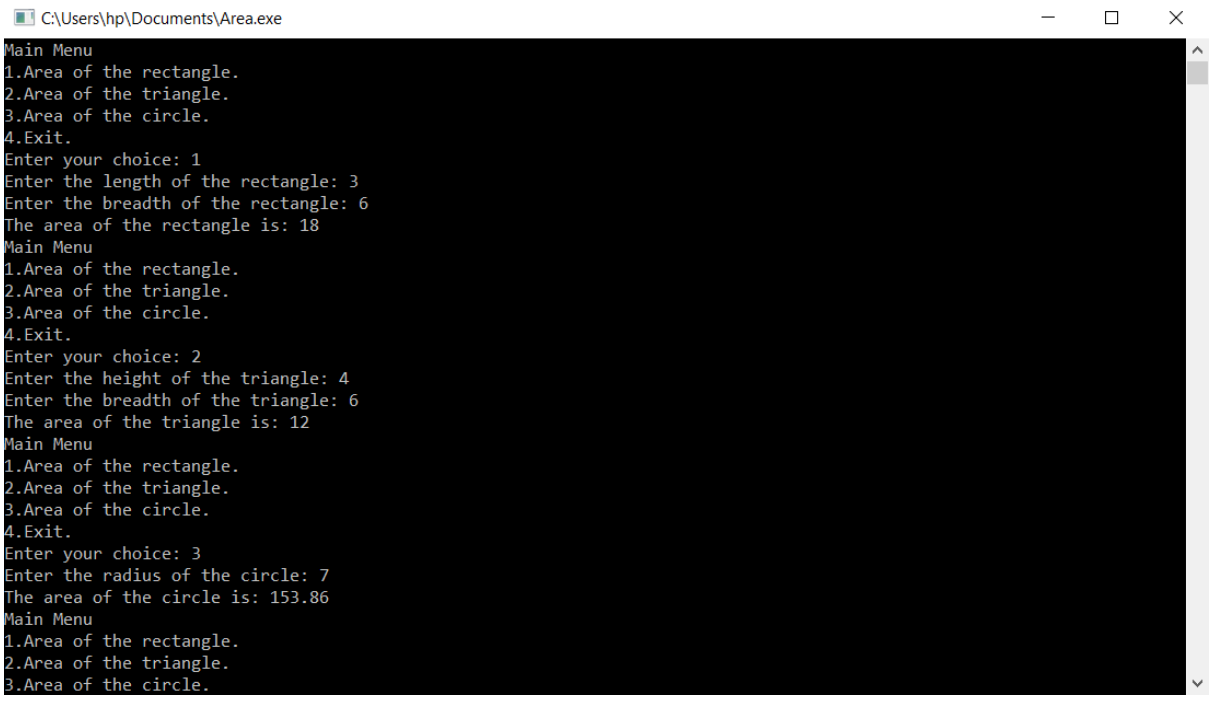
Code:

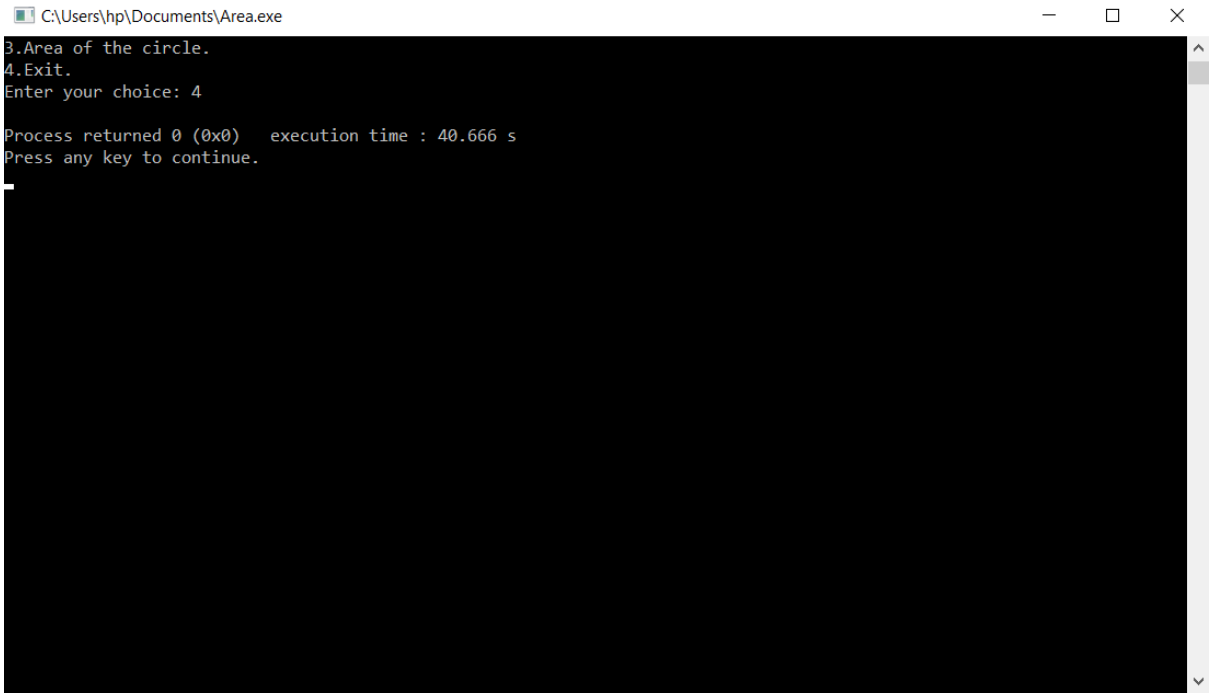
```
//Area.cpp
#include<iostream>
#include<cmath>
#define pi 3.14
float area(float l,float b)
{
return l*b;
}
float area(float h,float b,float x)
{
return h*b*x;
}
float area(float r)
```

```
{
return pi*r*r;
}
using namespace std;
int main()
{
float x=0.5;
float r,l,b,h,a;
int ch;
while(1)
{
cout<<"Main Menu"<<endl;
cout<<"1.Area of the rectangle."<<endl;
cout<<"2.Area of the triangle."<<endl;
cout<<"3.Area of the circle."<<endl;
cout<<"4.Exit."<<endl;
cout<<"Enter your choice: ";
cin>>ch;
switch(ch)
{
case 1:cout<<"Enter the length of the rectangle: ";
cin>>l;
cout<<"Enter the breadth of the rectangle: ";
cin>>b;
a=area(l,b);
cout<<"The area of the rectangle is: "<<a<<endl;
break;
case 2:cout<<"Enter the height of the triangle: ";
cin>>h;
cout<<"Enter the breadth of the triangle: ";
```

```
cin>>b;
a=area(h,b,x);
cout<<"The area of the triangle is: "<<a<<endl;
break;
case 3:cout<<"Enter the radius of the circle: ";
cin>>r;
a=area(r);
cout<<"The area of the circle is: "<<a<<endl;
break;
case 4:exit(0);
break;
}
}
}
```

Output:





Q11) Write a C++ program that overloads the unary ++ operator to increment each element of the given one - dimensional array by '1'.

Ans)

Code:

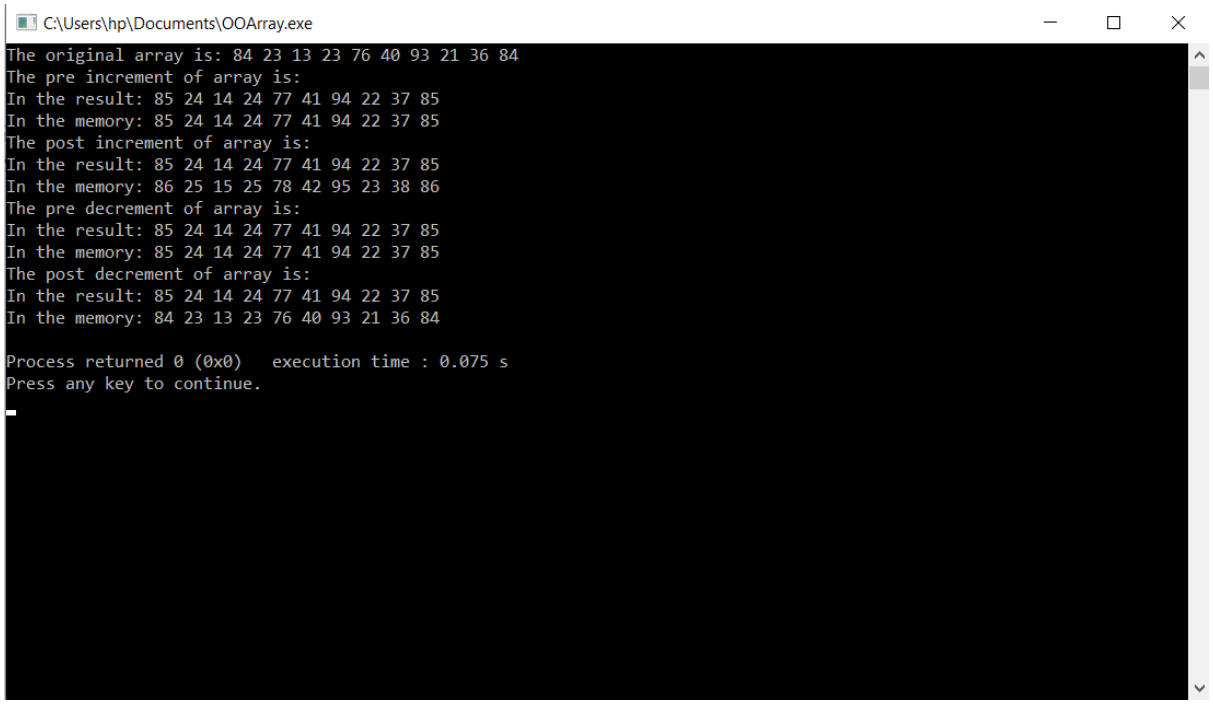
```
//OOArray.cpp
#include<iostream>
using namespace std;
class uniary_operator
{
int a[10];
public:
uniary_operator()
{
for(int i=0;i<10;i++)
{
this->a[i]=0;
}
}
```

```
uniary_operator(int a[])
{
for(int i=0;i<10;i++)
{
this->a[i]=a[i];
}
}
uniary_operator operator++()
{
uniary_operator ui(a);
for(int i=0;i<10;i++)
{
ui.a[i]=++a[i];
}
return ui;
}
uniary_operator operator--()
{
uniary_operator ui(a);
for(int i=0;i<10;i++)
{
ui.a[i]=--a[i];
}
return ui;
}
uniary_operator operator++(int)
{
uniary_operator ui(a);
for(int i=0;i<10;i++)
{
```

```
ui.a[i]=a[i]++;
}
return ui;
}
uniary_operator operator--(int)
{
uniary_operator ui(a);
for(int i=0;i<10;i++)
{
ui.a[i]=a[i]--;
}
return ui;
}
void print()
{
for(int i=0;i<10;i++)
{
cout<<a[i]<<" ";
}
cout<<endl;
}
};
int main()
{
int a[10]={84,23,13,23,76,40,93,21,36,84};
uniary_operator u1(a);
cout<<"The original array is: ";
u1.print();
cout<<"The pre increment of array is: "<<endl;
uniary_operator u2;
```

```
u2=++u1;
cout<<"In the result: ";
u2.print();
cout<<"In the memory: ";
u1.print();
cout<<"The post increment of array is: "<<endl;
uniary_operator u3;
u3=u1++;
cout<<"In the result: ";
u3.print();
cout<<"In the memory: ";
u1.print();
cout<<"The pre decrement of array is: "<<endl;
uniary_operator u4;
u4=--u1;
cout<<"In the result: ";
u4.print();
cout<<"In the memory: ";
u1.print();
cout<<"The post decrement of array is: "<<endl;
uniary_operator u5;
u5=u1--;
cout<<"In the result: ";
u5.print();
cout<<"In the memory: ";
u1.print();
return 0;
}
```

Output:



Q12) Write a program to calculate the total mark of a student using the concept of virtual base class.

Ans)

Code:

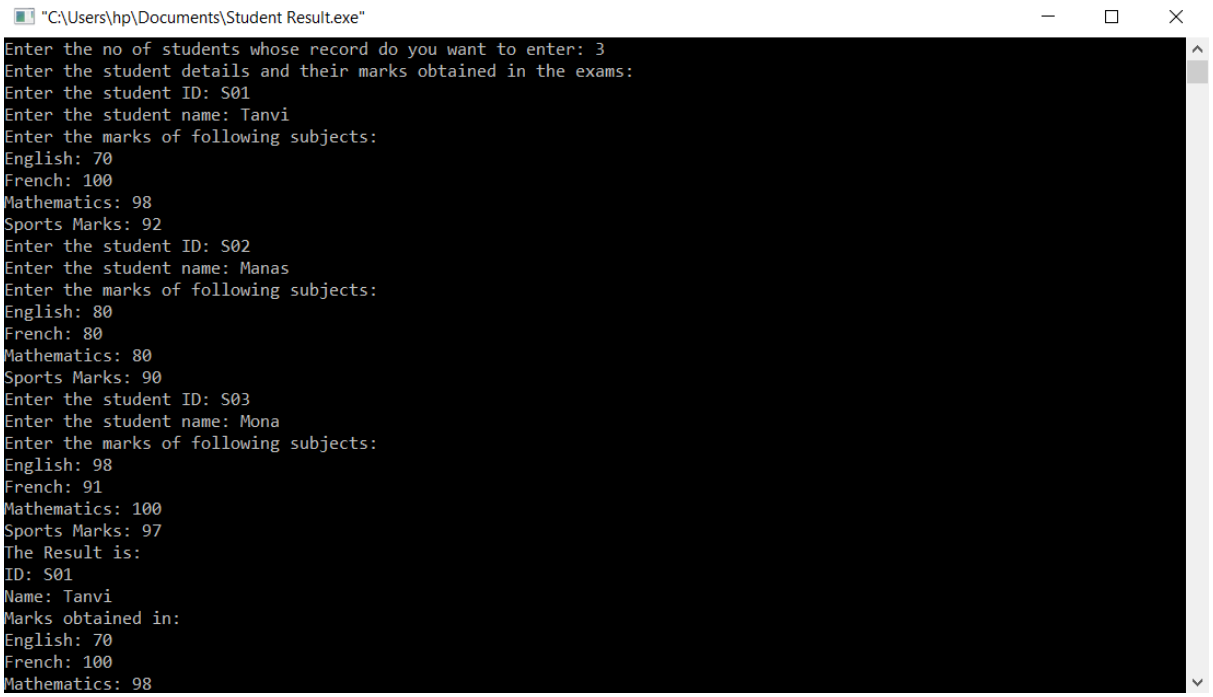
```
//Student Result.cpp
#include <iostream>
#include <string>
using namespace std;
class Student
{
protected:
string ID;
string name;
public:
void get()
{
cout<<"Enter the student ID: ";
```

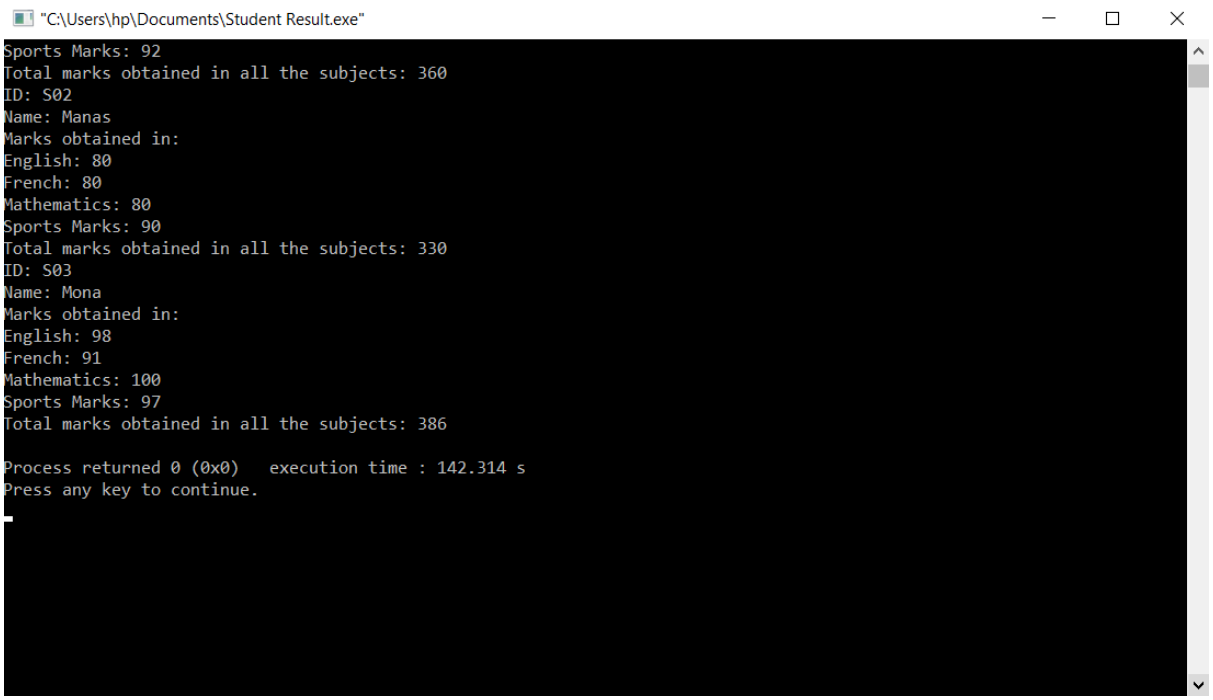
```
cin>>ID;
cout<<"Enter the student name: ";
cin>>name;
}
};
class Theory_Marks: public virtual Student
{
protected:
float english;
float french;
float maths;
public:
void getdata()
{
cout<<"Enter the marks of following subjects:"<<endl;
cout<<"English: ";
cin>>english;
cout<<"French: ";
cin>>french;
cout<<"Mathematics: ";
cin>>maths;
}
};
class Sport_Marks: public virtual Student
{
protected:
float sports_marks;
public:
void takes()
{
```

```
cout<<"Sports Marks: ";
cin>>sports_marks;
}
};
class Result: public Theory_Marks, public Sport_Marks
{
protected:
float total_marks;
float Marks()
{
total_marks=Theory_Marks::english+Theory_Marks::french+Theory_Marks::maths+Sport_
Marks::sports_marks;
return total_marks;
}
public:
void putdata()
{
cout<<"ID: "<<Student::ID<<endl;
cout<<"Name: "<<Student::name<<endl;
cout<<"Marks obtained in: "<<endl;
cout<<"English: "<<Theory_Marks::english<<endl;
cout<<"French: "<<Theory_Marks::french<<endl;
cout<<"Mathematics: "<<Theory_Marks::maths<<endl;
cout<<"Sports Marks: "<<Sport_Marks::sports_marks<<endl;
cout<<"Total marks obtained in all the subjects: "<<Marks()<<endl;
}
};
int main()
{
int n;
Result r[100];
```

```
cout<<"Enter the no of students whose record do you want to enter: ";
cin>>n;
if(n!=0)
{
cout<<"Enter the student details and their marks obtained in the exams:"<<endl;
for(int i=0;i<n;i++)
{
r[i].get();
r[i].getdata();
r[i].takes();
}
cout<<"The Result is:"<<endl;
for(int i=0;i<n;i++)
{
r[i].putdata();
}
}
}
```

Output:





Q13) Write a C++ program that to perform various operations on strings handling using string class.

Ans)

Code:

```
//String Class.cpp
#include<iostream>
#include<string>
using namespace std;
int main()
{
//Initialization in a string class.
string s1="Physics";
string s2("Mathematics");
string s3;
char *s4=new char[100];
//Taking input from string class object.
cout<<"Enter the string: ";
getline(cin,s3);
```

```
//Taking a character array input.
cout<<"Enter the character array: ";
cin.getline(s4,100);
//Output of string class object.
cout<<"Output is :"<<endl;
cout<<"s1= "<<s1<<endl;
cout<<"s2= "<<s2<<endl;
cout<<"s3= "<<s3<<endl;
//Output of character array.
cout<<"s4= "<<s4<<endl;
//Two swap the two string class objects.
s1.swap(s2);
//Don't do this.--> s3.swap(s4)-->To swap character array with the string class object.
cout<<"After Swapping:"<<endl;
cout<<"s1= "<<s1<<endl;
cout<<"s2= "<<s2<<endl;
//Finding String Objects.
//To find the position of the particular string in the given string order wise.
string s5="Computer System Architecture book is written by M.Morris Mano.";
int pos1=s5.find("Mano");
cout<<"pos1= "<<pos1<<endl;
//To find the position of the particular string that will scan the given string backwards.
int pos2=s5.rfind("Mano");
cout<<"pos2= "<<pos2<<endl;
//To find the position of a string that will match any of the character of the string in the argument from the given string.
int pos3=s5.find_first_of("Mano");
cout<<"pos3= "<<pos3<<endl;
//To find the position of a string that will match any of the character of the string in the argument from the given string from backwards.
int pos4=s5.find_last_of("Mano");
```

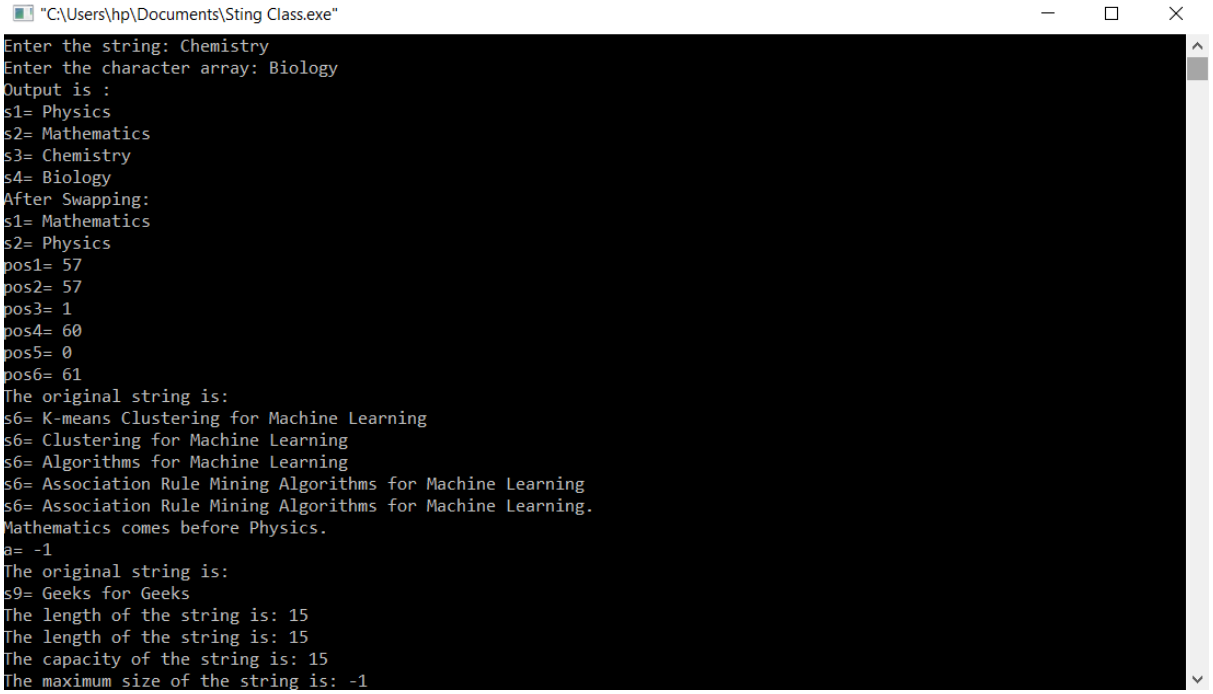
```
cout<<"pos4= "<<pos4<<endl;

//To find the position of a string that will not match any of the character of the string in the argument from the given string.

int pos5=s5.find_first_not_of("Mano");

cout<<"pos5= "<<pos5<<endl;

//To find the position of a string that will not match any of the character of the string in the argument from the given string from backwards.

int pos6=s5.find_last_not_of("Mano");

cout<<"pos6= "<<pos6<<endl;

//Modifying String Objects.

string s6("K-means Clustering for Machine Learning");

cout<<"The original string is:"<<endl;

cout<<"s6= "<<s6<<endl;

string s7("Association Rule Mining ");

string s8("Algorithms");

//To erase a particular string from a given string.

s6.erase(0,8);

cout<<"s6= "<<s6<<endl;

//To replace a particular string from another string in a given string.

s6.replace(0,10,s8);

cout<<"s6= "<<s6<<endl;

//To insert a string in a given string

s6.insert(0,s7);

cout<<"s6= "<<s6<<endl;

//To append a string or character in a given string.

s6.append(1,'.');

cout<<"s6= "<<s6<<endl;

//Comparing String Objects

//To compare a particular string from another string.

int a=s1.compare(s2);

if(a==0)
```

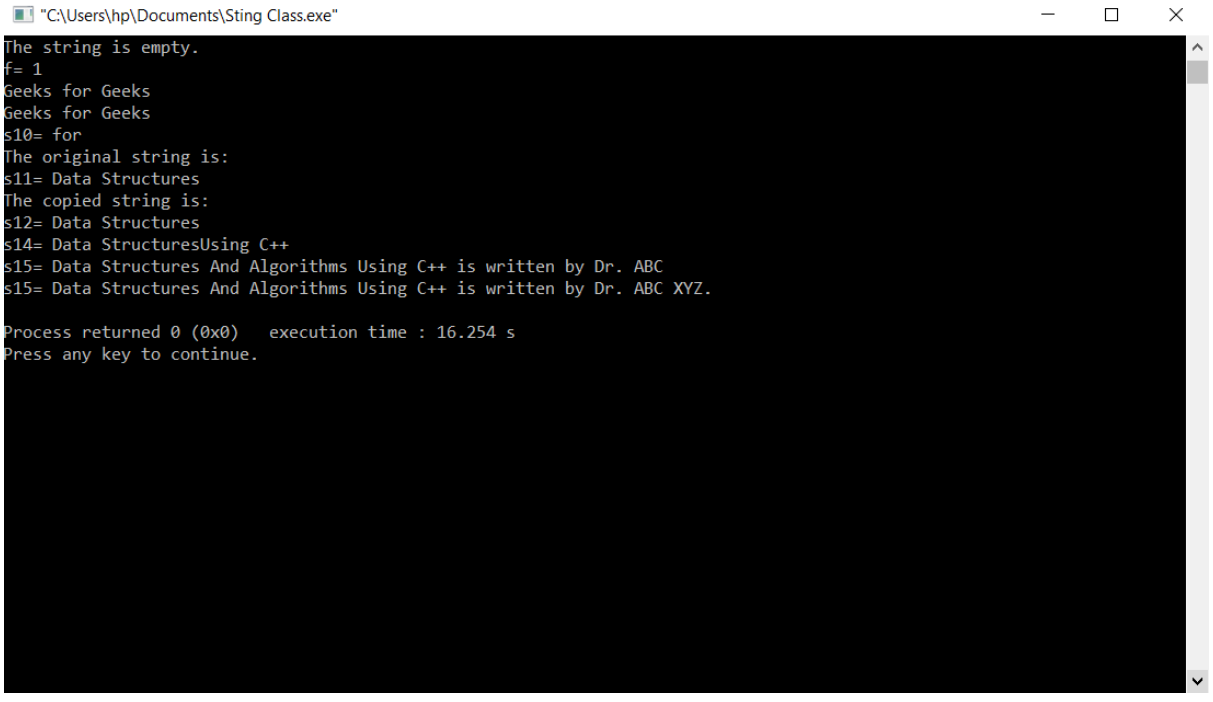
```
{
cout<<s1<<" matches with "<<s2<<"."<<endl;
cout<<"a= "<<a<<endl;
}
else if(a<0)
{
cout<<s1<<" comes before "<<s2<<"."<<endl;
cout<<"a= "<<a<<endl;
}
else
{
cout<<s2<<" comes before "<<s1<<"."<<endl;
cout<<"a= "<<a<<endl;
}
//Other String Functions
string s9="Geeks for Geeks";
string s10;
cout<<"The original string is:"<<endl;
cout<<"s9= "<<s9<<endl;
//To find the length of a string.
//Method 1
int b=s9.length();
cout<<"The length of the string is: "<<b<<endl;
//Method 2
int c=s9.size();
cout<<"The length of the string is: "<<c<<endl;
//To find out the capacity of the string.
int d=s9.capacity();
cout<<"The capacity of the string is: "<<d<<endl;
//To find out the maximum size of the string.
```

```
int e=s9.max_size();
cout<<"The maximum size of the string is: "<<e<<endl;
//To check whether a string is empty or not.
int f=s10.empty();
if(f)
{
cout<<"The string is empty."<<endl;
cout<<"f= "<<f<<endl;
}
else
{
cout<<"The string is not empty."<<endl;
cout<<"f= "<<f<<endl;
}
//To access a string characters.
//Method 1
for(int i=0;i<b;i++)
{
cout<<s9[i];
}
cout<<endl;
//Method 2
for(int i=0;i<b;i++)
{
cout<<s9.at(i);
}
cout<<endl;
//To find out the substring of a string.
s10=s9.substr(6,3);
cout<<"s10= "<<s10<<endl;
```

```
//Operations On String Class Objects Using Operator Overloading
string s11="Data Structures";
string s12;
string s13="Using C++";
string s14;
string s15;
//To copy the contents of one string into another.
s12=s11;
cout<<"The original string is:"<<endl;
cout<<"s11= "<<s11<<endl;
cout<<"The copied string is:"<<endl;
cout<<"s12= "<<s12<<endl;
//To concatenate two strings.
//Method 1
s14=s11+s13;
cout<<"s14= "<<s14<<endl;
//Method 2
s15=s11+" And Algorithms "+s13+" is written by Dr. ABC";
cout<<"s15= "<<s15<<endl;
//To append one string after an another string.
string s16=" XYZ.";
s15+=s16;
cout<<"s15= "<<s15<<endl;
return 0;
}
```

Output:





Q14) Write a C++ program to display the contents of a text file.

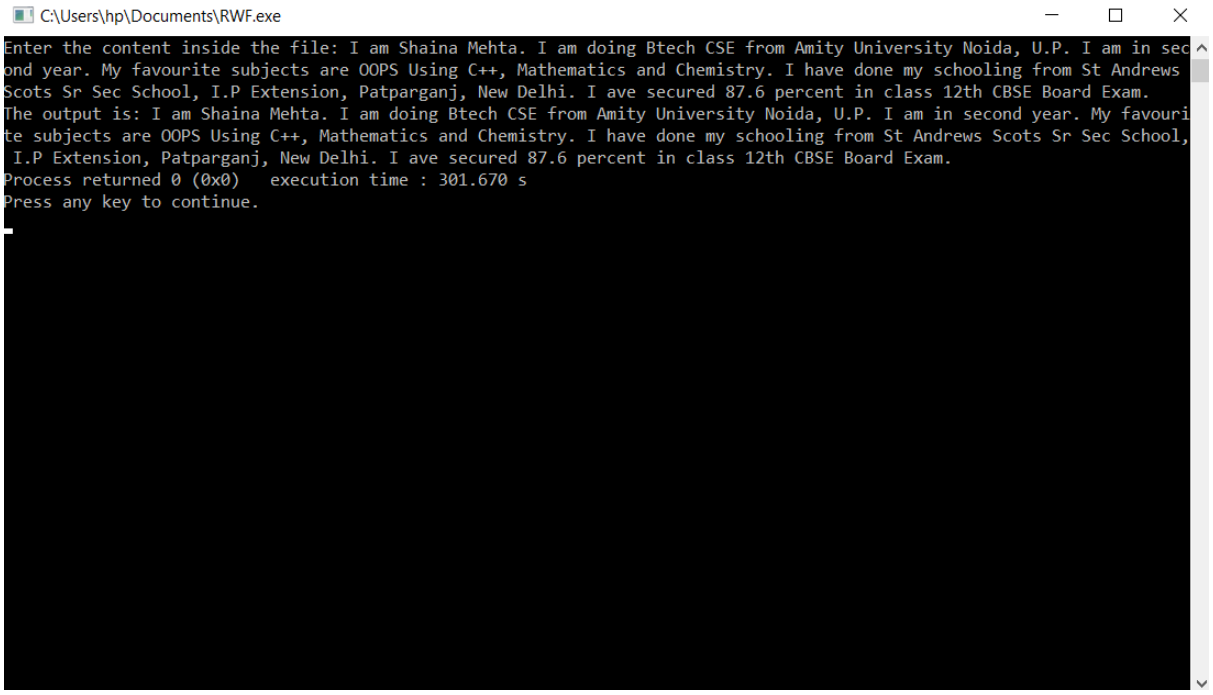
Ans)

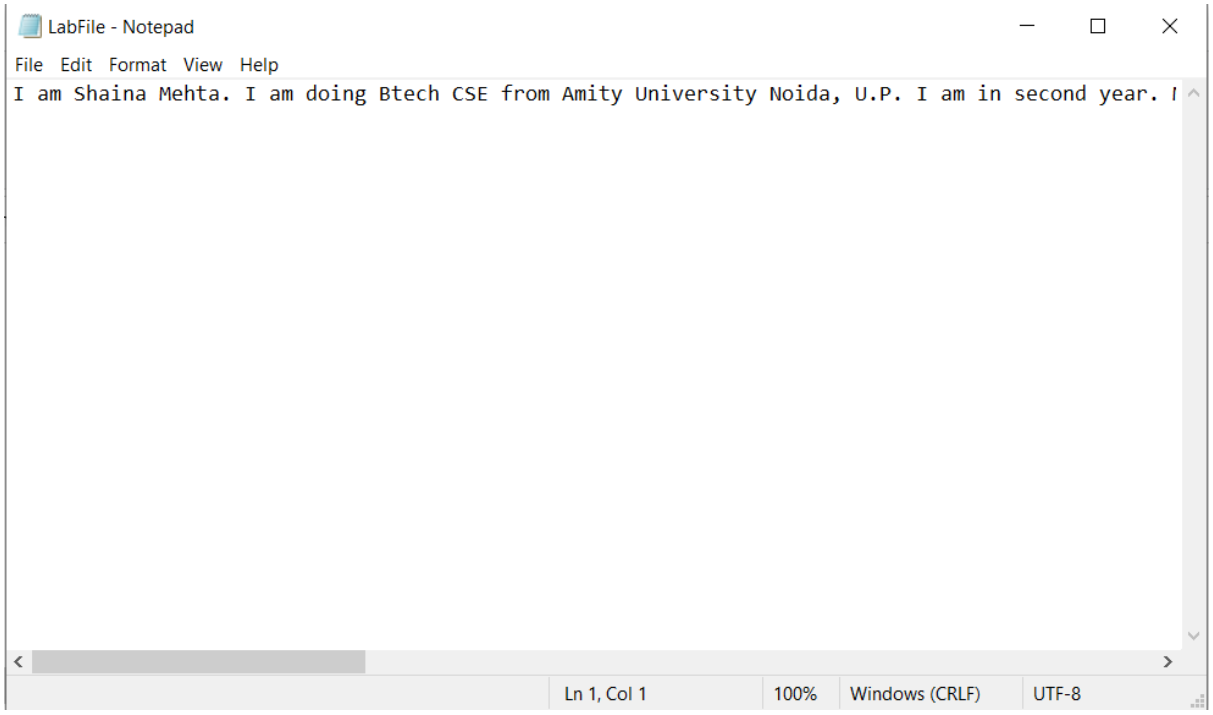
Code:

```
//RWF.cpp
#include<iostream>
```

```
#include<string>
#include<fstream>
using namespace std;
int main()
{
string s;
//To write the contents in a file.
fstream f;
f.open("LabFile.txt",ios::out);
cout<<"Enter the content inside the file: ";
getline(cin,s);
f<<s;
f.close();
//To read the contents from the file.
fstream f1;
f1.open("Labfile.txt",ios::in);
cout<<"The output is: ";
for(int i=0;i<s.size();i++)
{
f1.put(s[i]);
}
cout<<s;
f1.close();
}
```

Output:





Q15) Write a program to implement stack functions using templates.

Ans)

Code:

//StackUse.cpp

#include <cstddef>

template <typename T>

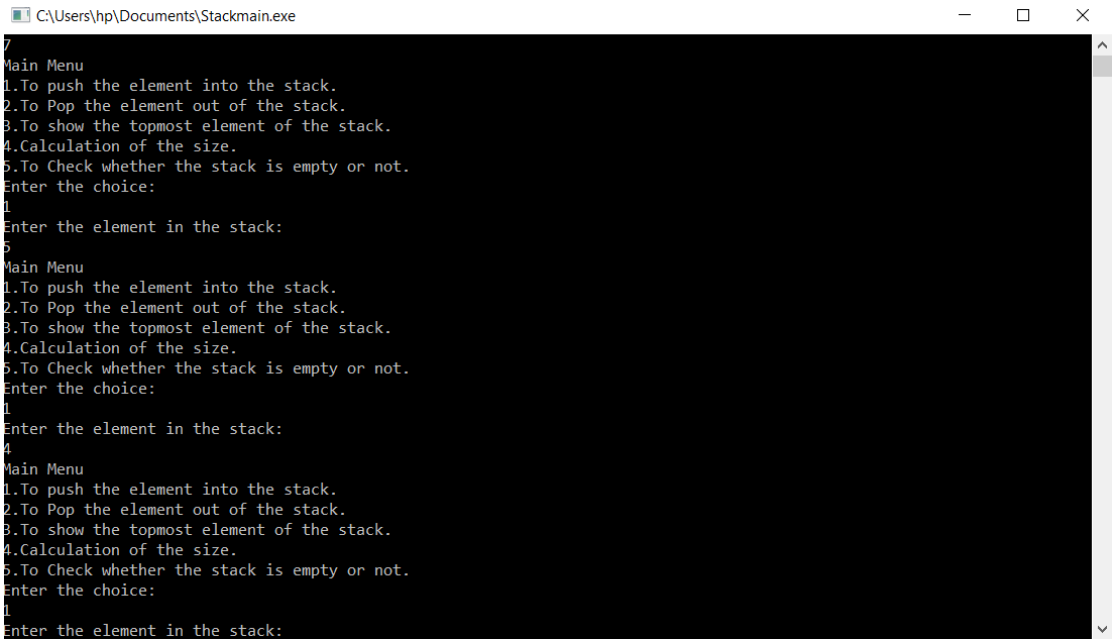
```
class Node {
public:
T data;
Node <T> *next;
Node(T data) {
this->data = data;
next = NULL;
}
};
template <typename T>
class Stack {
// Define the data members
Node <T> *head;
int size;
public:
Stack() {
// Implement the Constructor
head=NULL;
size=0;
}

/*----------------- Public Functions of Stack -----------------*/

int getSize() {
// Implement the getSize() function
return size;
}
bool isEmpty() {
// Implement the isEmpty() function
return size==0;
```

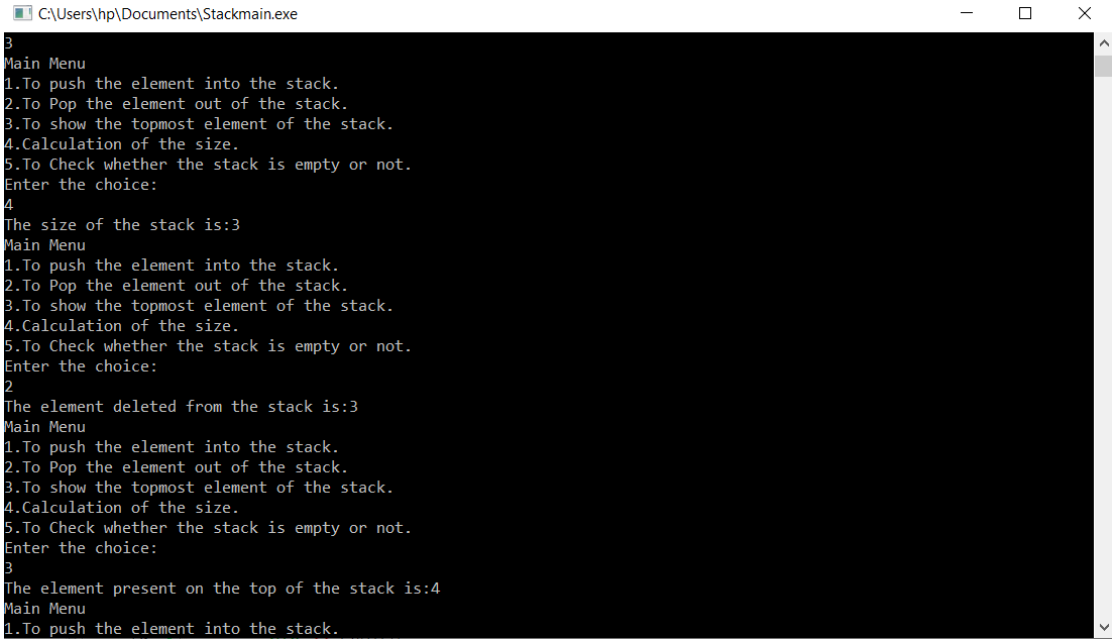
```
}
void push(T element) {
// Implement the push() function
Node <T> *newnode=new Node<T>(element);
if(head==NULL)
{
head=newnode;
}
else
{
newnode->next=head;
head=newnode;
}
size++;
}

T pop() {
// Implement the pop() function
if(head==NULL)
{
return -1;
}
else
{
size--;
Node <T> *a=head;
int b=a->data;
head=head->next;
delete a;
return b;
```

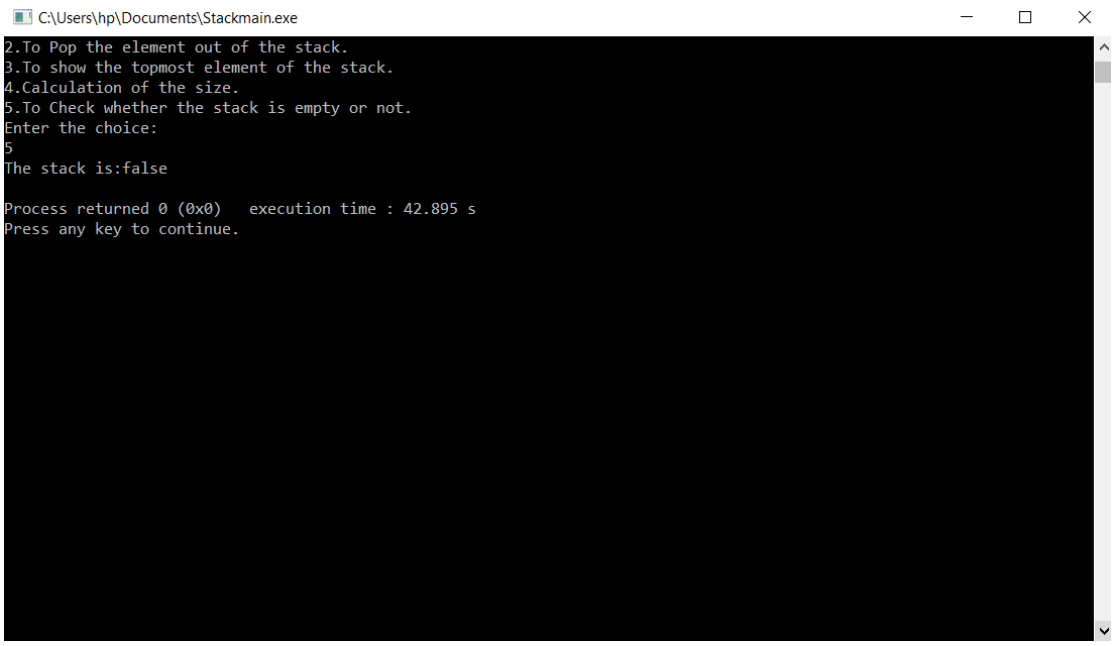
```
}
}
T top() {
// Implement the top() function
if(head==NULL)
{
return -1;
}
else
{
return head->data;
}
}
};
//Stackmain.cpp
#include <iostream>
using namespace std;
#include "StackUse.cpp"
int main() {
Stack <int> st;
int q;
cin >> q;
while (q--) {
cout<<"Main Menu"<<endl;
cout<<"1.To push the element into the stack."<<endl;
cout<<"2.To Pop the element out of the stack."<<endl;
cout<<"3.To show the topmost element of the stack."<<endl;
cout<<"4.Calculation of the size."<<endl;
cout<<"5.To Check whether the stack is empty or not."<<endl;
int choice, input;
```

```
cout<<"Enter the choice:"<<endl;
cin >> choice;
switch (choice) {
case 1:
cout<<"Enter the element in the stack:"<<endl;
cin >> input;
st.push(input);
break;
case 2:
cout <<"The element deleted from the stack is:"<< st.pop() << "\n";
break;
case 3:
cout <<"The element present on the top of the stack is:"<< st.top() << "\n";
break;
case 4:
cout <<"The size of the stack is:"<< st.getSize() << "\n";
break;
case 5:
cout <<"The stack is:"<< ((st.isEmpty()) ? "true\n" : "false\n");
break;
default:
cout<<"Invalid Entry."<<endl;
}
}
return 0;
}
```

Output:


C:\Users\hp\Documents\Stackmain.exe
7
Main Menu
1.To push the element into the stack.
2.To Pop the element out of the stack.
3.To show the topmost element of the stack.
4.Calculation of the size.
5.To Check whether the stack is empty or not.
Enter the choice:
1
Enter the element in the stack:
5
Main Menu
1.To push the element into the stack.
2.To Pop the element out of the stack.
3.To show the topmost element of the stack.
4.Calculation of the size.
5.To Check whether the stack is empty or not.
Enter the choice:
1
Enter the element in the stack:
4
Main Menu
1.To push the element into the stack.
2.To Pop the element out of the stack.
3.To show the topmost element of the stack.
4.Calculation of the size.
5.To Check whether the stack is empty or not.
Enter the choice:
1
Enter the element in the stack:


C:\Users\hp\Documents\Stackmain.exe
3
Main Menu
1.To push the element into the stack.
2.To Pop the element out of the stack.
3.To show the topmost element of the stack.
4.Calculation of the size.
5.To Check whether the stack is empty or not.
Enter the choice:
4
The size of the stack is:3
Main Menu
1.To push the element into the stack.
2.To Pop the element out of the stack.
3.To show the topmost element of the stack.
4.Calculation of the size.
5.To Check whether the stack is empty or not.
Enter the choice:
2
The element deleted from the stack is:3
Main Menu
1.To push the element into the stack.
2.To Pop the element out of the stack.
3.To show the topmost element of the stack.
4.Calculation of the size.
5.To Check whether the stack is empty or not.
Enter the choice:
3
The element present on the top of the stack is:4
Main Menu
1.To push the element into the stack.


C:\Users\hp\Documents\Stackmain.exe
2.To Pop the element out of the stack.
3.To show the topmost element of the stack.
4.Calculation of the size.
5.To Check whether the stack is empty or not.
Enter the choice:
5
The stack is:false
Process returned 0 (0x0)   execution time : 42.895 s
Press any key to continue.