CEC 101: Computer Programming

Civil Engineering Autumn 2023-24

Practical 9: OOP Concepts

Q1. Predict the output for the following:

```
#include<iostream>
#include<string.h>
using namespace std;
class String {
   string str;
   public:
   String(string s);
   void change(int index, char c) {
      str[index] = c;
   }
   string get() {
      return str;
   }
};

String :: String(string s) {
   str=s;
}

int main()
{
String s1("s-one");
String s2 = s1;
s1.change(0, 'G');
cout << s1.get() << " ";
cout << s2.get();
}
```

```
#include<iostream>
#include<string.h>
using namespace std;
class String {
   char* str;
   public:
   String(const char* s);
   void change(int index, char c){
      str[index] = c;
   }
   char* get(){
      return str;
   }
};

String :: String(const char* s) {
   int l = strlen(s);
   str = new char[l+1];
   strcpy(str, s);
}

int main()
{
String s1("s-one");
String s2 = s1;
s1.change(0, 'G');
cout << s1.get() << " ";
cout << s2.get();
}
```

Q2. Create a C++ program containing two classes, Shape and Circle, where Circle is derived from Shape. The Shape class has a member function getArea() that calculates and returns the area of the shape. The Circle class has a member variable radius and overrides the getArea() function to calculate the area of a circle.

Q3. A boy has his money deposited Rs. 1000, Rs. 1500 and Rs. 2000 in banks-Bank A, Bank B and Bank C respectively. The task is to display the money deposited in a particular bank. Create a class 'Bank' with a function 'getBalance' which returns 0. Make its three subclasses named 'BankA', 'BankB' and 'BankC' with a function with the same name 'getBalance' which returns the amount deposited in that bank. Call the function 'getBalance' by the object of each of the three banks.

Q4. Predict the output for the following:

```
#include<iostream>
using namespace std;

class base{int arr[10];};

class b1:public base{ };
class b2:public base{ };

class derived: public b1, public b2 { };

int main(){
cout << sizeof(base) << endl;
cout << sizeof(b1) << endl;
cout << sizeof(b2) << endl;
cout << sizeof(derived) << endl;
return 0;
}
```

```
#include <iostream>
using namespace std;
class A {
public:
A() {cout << "A's constructor called" << endl;}
};

class B : public A {
public:
B() {cout << "B's constructor called" << endl; }
};

class C : public B {
public:
C() {cout << "C's constructor called" << endl; }
};

int main() {
   C obj;
   return 0;
}
```

Special Problem. All the banks operating in India are controlled by RBI. RBI has set a well-defined guideline (e.g., minimum interest rate, minimum balance allowed, maximum withdrawal limit etc.) which all banks must follow. For example, suppose RBI has set minimum interest rate applicable to a saving bank account to be 4% annually; however, banks are free to use 4% interest rate or to set any rates above it.

Write a program to implement bank functionality in the above scenario. Note: Create few classes namely Customer, Account, RBI (Base Class) and few derived classes (SBI, ICICI, PNB etc). Assume and implement required member variables and functions in each class.