

THE OPEN UNIVERSITY OF SRI LANKA
 B.Sc DEGREE PROGRAMME: LEVEL 04
 FINAL EXAMINATION: SEMESTER 1-2013/2014
CPU2242: OBJECT ORIENTED PROGRAMMING USING C++ AND JAVA

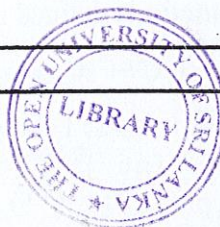


DURATION: **THREE HOURS (3 HOURS)**

Date: 11th June, 2014

Time: 1.00 pm – 4.00 pm

Answer FOUR Questions ONLY.



Q1.

- What is *Object Oriented Programming* (OOP)? Write down four (04) advantages of Object Oriented Programming over Procedure Oriented Programming?
- Differentiate between *procedure-oriented programming* and *object-oriented programming*.
- List three (03) differences between C++ and Java.
- Explain the process of converting a Java stand-alone program (source code) into a machine language.
- What is an *abstract class*?

Q2.

- Write three (03) advantages of using functions in a C++ program.
- Explain the following types of errors in a computer program.
 - Syntax errors
 - Logical errors
 - Run-time errors
- Is the following code correct? Precisely write the output of the code.


```
int intvar = 333;
int *intptr;
intptr = &intvar;
cout << *intptr;
```
- Write a function called `zeroSmaller()` that is passed two `int` arguments by reference and then sets the smaller of the two numbers to 0.
 - Write a `main()` function to call the function in question d) (i).
- State whether the following statements are **TRUE** or **FALSE**.
 - `x++` is a valid C++ variable name.

- ii. When an argument is passed by reference, a variable is created in the function to hold the argument's value in C++.
- iii. Java was invented by Bjarne Stroustrup. /
- iv. Member functions defined inside a class definition are public by default in C++.
- v. The following C++ statements,

```

for (int i=1;i<=5;i++){
    for (int j=1;j<=i;j++){
        cout << '*';
    }
}

```

produces the following output.

```

*
* *
* * *
* * * *
* * * * *

```

Q3.

- a) Write three (03) differences between a *Java applet* and a *Java stand-alone application*?
- b) Consider the following Java class

```

class Hello {
    public static void main (String[] args) {
        System.out.println ("Hello: This is my first Java program");
    }
}

```

Explain why the keywords **public**, **static** and **void** are included in the header of the `main ()` method.

- c) State whether the following names are valid Java identifiers. Briefly explain how you arrived to your conclusion.
 - i. `totalPay`
 - ii. `volatile`
 - iii. `3StudentsName`
 - iv. `_months`
 - v. `total-days`

d) Consider the following Java program and precisely write the output of the program.

```
class MyClass {
    static int maxElements;
    MyClass (int maxElements){
        this. maxElements = maxElements;
    }
}

public class Q2 {
    public static void main (String[] args) {
        MyClass a = new MyClass (100);
        MyClass b = new MyClass (100);

        if (a.equals (b))
            System.out.println ("Objects have the same values");
        else
            System.out.println ("Objects have different values");
    }
}
```

Q4.

- a) What is *encapsulation*? What are its advantages?
- b) Differentiate between *function overloading* and *function overriding*.
- c) State whether the following statements are **TRUE** or **FALSE**.
 - i. In a class definition, data or functions designed private are accessible only to public members of that class.
 - ii. A dot operator (class member access operator) connects a class member and a class object when reading the statement from left to right.
 - iii. In a class you can have more than one constructor with the same name.
 - iv. Adding a derived class to a base class requires fundamental changes to the base class.
 - v. The scope resolution operator usually tells what base class a class is derived from.
- d) Briefly explain the following terms in object-oriented programming:
 - i. Abstraction
 - ii. Inheritance
 - iii. Polymorphism

- e) Give an example to describe the relationship between a *class* and an *object*.
- f) Define a C++ class (named `Circle`) to represent a circle that includes the following data member.
 - Radius of the circle

Include the following member functions to the `Circle` class and implement them.

- i. A default constructor to create a circle with radius 1.
- ii. A parameterized constructor to initialize data member of the class to the value passed as the parameter.
- iii. To return the area of the circle πr^2 where r is the radius of the circle.
- iv. To display the area of the circle.

Q5.

- a) What is *operator overloading*?
- b) Write a C++ class named `Time` to represent 12-hour time that consists of seconds, minutes and hours. Use integer values to hold them and include the following member functions.
 - i. A default constructor and a parameter constructor.
 - ii. To overload `+` operator to add two times.

(Hint: If read the two times as; time 1 = 5:59:59, time 2 = 4:30:30, then resulting time should be as 10:30:29)
- c) What are *friend functions*? Explain three (03) characteristics with a suitable example.
- d) Rewrite the question (b) (ii) using a friend function.

Q6.

- a) How do the properties of following two derived classes differ?

```
class X : public A{
    //..
}
class Y : private A{
    //..
}
```

- b) Class Y has been derived from class X. The class Y does not contain any data members of its own. Does the class Y require constructor. If yes, why?
- c) What is *multiple inheritance*? Discuss the syntax and rules of multiple inheritance in C++.

d) Write the following classes in c++:

- i. **Student** is a base class having two data members: entryno and name; entryno is integer and name of 20 characters long. The value of entryno is 1 for Science student and 2 for Arts student, otherwise it is an error.

Include a member function to the class named `getdata()` to read information of a student.

- ii. **Science** and **Art** are two derived classes, having respectively data items marks for Physics, Chemistry, Mathematics and marks for English, History, Economics.

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