The Open University of Sri Lanka
B.Sc. Degree Programme : LEVEL 05
Department of Mathematics and Computer Science
Final Examination 2009/2010
CSU 3279 – OBJECT ORIENTED PROGRAMMING – Paper II
DURATION: **Two and Half hours (2 ½ hours)**

Date: 16/01/2010 **Time: 9.30 a.m. – 12.00 noon**

Answer **FOUR** questions **ONLY**

QUESTION 1

1.1) In the context of JAVA programming language state whether the following statements are **True** or **False.**

a) Two methods with different signatures cannot have the same name in *JAVA*.
b) A variable declared inside a 'for loop' control cannot be referenced outside the loop.
c) *JAVA* always provides a default constructor to a class.
d) Static method of a class is called by using an object of the class.
e) Protected members of a class are visible everywhere in the package that the class is contained and subclasses in other packages.
f) Derived classes cannot override a function when it is defined with **final** keyword in *Base class*.
g) All functions in *JAVA* are defined as virtual functions by default.
h) The **super** keyword is used from a derived class (subclass) to access a hidden member in parent class (super class).
i) Abstract classes can be instantiated.
j) The keyword **continue** is used to skip the current iteration of a while loop.

1.2)
a) Explain how *JAVA* programs achieve the platform independency and the portability.
b) State three (03) differences between *JAVA* and *C++*.
c) How is JAVA language said to be more secure than other languages?
d) What is multithreading? How does it improve the performance of a *JAVA* program?
e) How is the programming language '*JAVA*' strongly associated with the Internet?

QUESTION 2

2.1) a) What is *object-oriented* programming? How is it different from the *procedure-oriented* programming?

b) Write the structure of a JAVA program and describe each component of the structure.

c) Describe the following terms in object-oriented programming

- Encapsulation
- Data hiding
- Abstraction
- Polymorphism

2.2) Write a JAVA program to convert the given temperature in Fahrenheit to Celsius.

Hint : $C = \frac{F-32}{1.8}$ where C and F are Celsius and Fahrenheit values respectively.

QUESTION 3

3.1) What are the different levels of access protection available in JAVA.

3.2) Design a JAVA class named 'BankAccount' to represent a bank account. Include the following members:

Data members:

- Name of the account holder
- Account number
- Balance amount in the account

Methods

- Constructor to assign values to data members
- To deposit an amount
- To withdraw an amount after checking the balance
- To display the name and the balance.

3.3) Write a JAVA class to test the class defined in 3.2.

QUESTION 4

4.1) What is *inheritance* in *object-oriented* programming?

4.2) What are the different levels of access protection available in classes for data and methods defined in C++ (explain briefly with a diagram).

4.3) Consider the following two base classes B1 and B2 and the derived class D.

```
class B1 {
    private:
        int jack;
    protected:
        double jill;
    public:
        void jack_and_jill (float);
};
```

```
class B2 {
    private:
        char humpty;
    protected:
        long dumpty;
    public:
        double humpty_dumpty ();
};
```

Class D is derived from classes B1 and B2 as follows:

```
class D: public B1, private B2 {
    private:
      int itzy;
      void bitzy (float);
    protected:
      float spider (float);
    public:
      void show_itzy_bitzy_spider ();
};
```


Use the above information to

i. List the *inherited members* in class D which are inherited from classes B1 and B2.

ii. Write the accessible levels of those inherited members (4.3 i) in class D.

QUESTION 5

5.1)

a) What is meant by the term `constructor` in the context of C++?

b) Give the difference between *user-defined constructor* and *default constructor*.

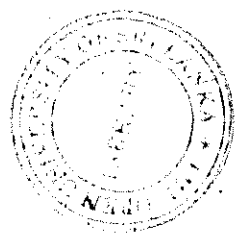
c) What is meant by overloading constructor? Explain using a class called CUBE having three data variables Length, Width, Height.

d) Write three different user defined constructor definitions that can be written for CUBE class.

5.2) a) Describe when the `destructor` of a class is important?

b) The following part of a class is defined to manipulate a dynamic array in C++.

```
class Array {
    private:
      int n;
      float * arr;
    public:
      Array (int size) { // Constructor
          n = size;
          arr = new float[n];
      }
      ...
    };
```



Write a `destructor` for the class 'Array'.

QUESTION 6

6.1) a) What is an `exception` in JAVA programming language
b) Briefly explain `try, catch, finally` keywords in JAVA.
c) Write the syntax of handling an `exception` in JAVA using the keywords explained in 6.1b.

6.3) a) Explain the term *aggregation* in *object oriented* programming.

b) Describe the following properties of *aggregation*.
(i) Transitivity
(ii) Anti-symmetry
(iii) Propagation

6.3 a) Explain what is a `Friend function` in C++ and give advantages of having `Friend functions`.
b) How do you define a `Friend class` in C++ (explain using a small example).