THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

ECX4262 – OBJECT ORIENTED DESIGN AND PROGRAMMING

FINAL EXAMINATION - 2010/ 11 ***CLOSED BOOK***

Date: April 02, 2011 **Time: 1400 – 1700 hrs**

<INSTRUCTIONS>

There are **two** sections; **SECION A** and **SECTION B.**
SECTION A has 1 general question; **Q1** is **mandatory.**
SECTION B has 5 questions; **Q2** to **Q6.** Answer to **3** selected questions on your preference.

SECION A
[Q1] (Compulsory question)

(i) State the Object Oriented Programming(OOP) concepts and the uses of the same? ***[04 marks]***

(ii) Programming to an interface is a practice that is followed in OOP.
(a.) State two advantages that is achieved with this practice.

(b.) Explain with Java or C interfaces and classes using code snippets how to achieve this?

(c.) Why is decoupling important in OOP? ***[09 marks]***

(iii) Write a code snippet to demonstrate singleton design pattern with Java or C. ***[08 marks]***

(iv) Draw the class diagram for the (ii)(b.) code snippets ***[08 marks]***

(v) Write the output for the following code snippet. ***[05 marks]***

```
int c = 1;
    for (int i = 1; i <= 5; i++) {
        for (int j = i; j < 5; j++) {
            System.out.print(" ");
        }
        for (int k = 1; k <= c; k++) {
            if (k % 2 == 0)
                System.out.print(" ");
            else
                System.out.print("*");
        }
        System.out.println();
        c += 2;
    }
```

SECTION B
Select and answer to any of 3 questions from Q2 – Q6

[Q2]

(i) State the types (categories) of design patterns each with example.
[02 marks]

(ii) Explain the iterator pattern using a java code snippet (any loop with a collection)
[05 marks]

(iii) What are the common and different characteristics of the Bridge and the Strategy design patterns?
[05 marks]

(iv) When should the delegation pattern used over inheritance to extend a class's behavior?
[05 marks]

(v) Explain an Object Relational Mapping frame work and its uses as you see.
[05 marks]

[Q3]
Consider the following code segment to answer to the question (i) and (ii).

```
/** Bank Interface */
public interface Bank {
   public abstract String getAccount();
}
/** Commercial Bank class */
public class CommercialBank implements Bank {
   public String getAccount() {
      return "Commercial Savings Account";
   }
}
/** Seylan Bank class */
public class SeylanBank implements Bank {
   public String getAccount() {
      return Seylan Savings Account";
   }
}
/** Customer class */
public class Customer {
   private Bank bank;
   public Investor(Bank bank) {
      this.bank = bank;
   }
      public void setBank(Bank bank) {
      this.bank = bank;
   }
      public String openAccount() {
      return "I have an account of " + this.bank.getAdvice();
   }
}
```

(i) Draw the class diagrams for the above class structure and identify the relationships among those. *[08 marks]*

(ii) What are the key components in Use Case diagrams? Explain using a suitable scenario (With drawing the use case diagrams for the given scenario). *[08 marks]*

(iii) Differentiate between the following;
a.) 'class' and 'object'
b.) 'generalization' and 'association' relationship *[06 marks]*

[Q4]

(i) Write the Java code segment to reverse the elements of an array. *[07 marks]*

(ii) Write the Java code to calculate the average grade for 4 subjects using a loop. Also prompt the user for the marks for each subject and display the final average. *[12 marks]*

(iii) Write the output of the below code snippet. *[03 marks]*

```
int n = 2;
int i = 1;
System.out.println("The table of " + n);
System.out.println("==========");
 while(i <= 10) {
  int t = n * i;
  System.out.println(n + "*" + i + " = " + t);
  i++;
}
```

[Q5]

(i) Briefly outline the purpose of using access specifies to designate the members of a class as private, protected or public. *[05 marks]*

(ii) Distinguish between single and multiple inheritances. Use suitable diagrammatic examples to illustrate your answer. *[08 marks]*

(iii) What is the purpose of defining a method as abstract? *[05 marks]*

(iv) What is meant by the term signature in describing a method? *[04 marks]*

[Q6]

(i) Explain the meaning of the following terms within the context of an object oriented programming language:

a) method b) message

[06 marks]

(ii) What advantages do object-oriented languages gain through the implementation of the above (in Q6 (i)) features? *[04 marks]*

(iii) Explain how overloading and overriding contribute to the implementation of polymorphism in object oriented languages. *[06 marks]*

(iv) State the most suitable UML diagram to fulfill the below requirements.

a.) to show the physical relationship between software components and the hardware of a system delivered

b.) to plan project activities such as developing new functionalities or test cases

[06 marks]