01169

The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical and Computer Engineering

Study Programme	: Bachelor of Software Engineering Honours
Name of the Examination	: Final Examination
Course Code and Title	**: EEI3262 Introduction to Object Oriented Programming**
Academic Year	: 2021/22
Date	: 10th February 2022
Time	: 0930-1230hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Five (5)** questions in **Three (3)** pages.
3. **Answer all the questions.**
4. Answer for each question should commence from a new page.
5. This is a Closed Book Test **(CBT).**
6. Answers should be in clear hand writing.
7. Do not use red colour pen or pencil.

Q1 [40 Marks]

Software is needed to be created for a private hospital. One main entity is the **patients**. The below common information is needed to be stored for a **Patient.**

- Name
- Age
- Disease
- Number of times visited the hospital

An **abstract method** to calculate and return the discount percentage as decimal value is also needed to be there.

In-patients separately store
- Date of Admission
- Date of Discharge

Out-patients separately store
- Date of Last Appointment
- Date of Next Appointment

It was decided to create a **separate class** to store the **dates.**

a) Create the **Date** class to store **year, month and day** as separate numbers with a **constructor** to assign the values and a **method** to return the whole combined date as a string. This class need to be **encapsulated**.

[15 Marks]

b) Create the **Patient** class as an **abstract class** with the above mentioned members.

[8 Marks]

InPatient and **OutPatient** classes are created as **subclasses** of **Patient** class.

c) Create the **InPatient** class with the above mentioned members. Discount percentage is calculated as below.
If the year of admission and discharge is the same And the month of admission and discharge is different, then a discount of 10% is given. Else 0.

[10 Marks]

d) Create the **OutPatient** class also similarly. Here discount is calculated as follows.
If the number of times visited the hospital is greater than 10, then a discount of 5% is given. Else 0.

[7 Marks]

Q2 [15 Marks]

a) Briefly define the following terms in your words.
   I. Integrated Development Environment (IDE)
   II. Constructor
   III. Method overriding
   IV. Java Virtual Machine (JVM)
   V. Refactoring

[2x5=10 Marks]

(question continued on next page)

b) Identify the syntax errors and write the corrections that need to be made in the following Java program.

```
Class Main {
   string s;
   Main(r){
      this.s=r;
   }
   public void static main (String[] arguments) {
      long num1 = 100;
      double num2 = 75;
      char num3 = 50;
      System.out.print(num1+num2+num3);
   }
   boolean isTrue (boolean x, boolean x) {
      return x==y;
   }
}
```

[5 Marks]

Q3 [15 Marks]

a) Write the output of the following Java code.

```
class Final{
   public int a;
   public int b;
   Final()
   {
      a = 7;
      b = 14;
   }
}
class Exam extends Final{
   int x;
   Exam()
   {
     a = 0;
     x = b + 7;
   }
}
class SuperUse{
   public static void main(String args[])
   {
      Exam obj = new Exam();
      System.out.println(obj.a + " & " + obj.b);
   }
}
```

[5 Marks]

(question continued on next page)

b) Write the output of the following Java code.

```
class Main {
  public static void main (String [] arguments) {
    int x = 10;
    for (int y = 10; y <= 30; y++){
      if (y % x != 0)
        continue;
      System.out.print(y + " ");
    }
  }
}
```

[5 Marks]

c) Write the correct answer that should come in the blank.

I. If a subclass defines a method with the same signature as the superclass method, we call it method ..... .

II. A ..... in Java is used to group related classes. Can think of it as a kind of a folder.

III. In ..... principle, the variables of a class will be hidden from other classes and can be accessed only through the methods of their class.

IV. ..... is improving the internal structure of an existing program's source code, while preserving its external behavior.

V. A ..... error cause an error message to be generated by the compiler.

[1x5 = 5 Marks]

Q4 [20 Marks]

a) Create two methods, one that takes two integers as parameters and return the addition and the other method takes four parameters and return the addition. Use the method overloading concept. Then write how you would call those two methods. *(No need to write a complete programme. Only write the methods.)*

[10 Marks]

b) Assume in an already created class, a method called "getSalary()" has been created to return its double "salary" variable. Now think that you are extending that class to a new class you are going to create. In this new class, the salary is returned by deducting 1000 rupees. Write this new "getSalary()" method using method overriding concept. *(No need to write a complete programme. Only write the method.)*

[10 Marks]

Q5 [10 Marks]

a) Write the two Java statements that are essential for taking input from a user. [2 Marks]

b) Refactor this class according to the **extract subclass** refactoring method with respect to an employee and a university student.

```
class Person{
        String name;
        int age;
        int employeeNumber;
        int studentId;
        String NIC;
}
```

[8 Marks]

END