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International College Penang
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FINAL
Examination Paper

(COVER PAGE)

Session	:	**April 2017**
Programme	:	Diploma in Electrical and Electronic Engineering (DEEI)
Course	:	**CSC2181: Object-Oriented Programming In Java**
Date of Examination	:	2 August 2017 (Wednesday)
Time	:	11:00am – 1:00pm Reading Time : Nil
Duration	:	2 Hours
Special Instructions	:	

This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

IMPORTANT NOTE : THIS PAPER SHOULD NOT BE TAKEN OUT OF THE EXAMINATION HALL

Materials permitted :

Nil

Materials provided :

Nil

Examiner(s) : **Chern Huey Rong**

Moderator : Dr. Vincent Khoo Kay Teong

*This paper consists of **9** printed pages, including the cover page.*

INTI INTERNATIONAL COLLEGE PENANG

DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING PROGRAMME (DEEI)
CSC2181: OBJECT-ORIENTED PROGRAMMING IN JAVA
FINAL EXAMINATION: APRIL 2017 SESSION

Instructions: This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) Write out the output of the following code in the spaces provided.

```
public class FinalExam
{
      public static void main(String[] args) {
      // Declare and allocate array
      double array[] = new double[5];
      // Initialize array
      for (int index = 0; index < array.length; index++)
            array[index] = (index * 3.0) + 0.5;
      // Print array information
      System.out.println(array.length - 2);
      System.out.printf("%0.2f\n", array[2]));
      System.out.printf("%0.2f\n", array[3] * 2.0));
      System.out.printf("%0.2f\n", (array[4] + 0.45));
      System.out.printf("%0.2f\n", (array[5]));
      }
}
```

(10 marks)

(b) Write a Java conditional statement that implements the table below, where grade is an integer and school is a string. Both variables have been declared and grade has been initialized to a value greater than or equal to 1.

If **grade** is:	Set **school** to:
1, 2, 3, 4, 5	Elementary School
6, 7, 8	Junior High
9, 10, 11, 12	High School
> 12	College

(5 marks)

(c) Write a program to find the sum of all integers greater than 100 and less than 200 that are divisible by 7.

(5 marks)

(d)

```
public class Human {
        private String Name;
        private int Age;
        public Human(String Name, int Age) {
                this.Name = Name;
                this.Age = Age;
        }
}

public class Office {
        public static void main(String args[ ]) {
                Human a = new Human( );
        }
}
```

Identify the error in the Java code above. Modify the code to fix the error.

(5 marks)

Question 2

(a) List 4 syntax and / or logic errors and provide the corrections.

```
public class Hobbit extends Actor {
      public static constant double MAX_STEALTH = 100.0;
      private double stealth;

      public void Hobbit() {
            stealth = MAX_STEALTH / 2.0;
      }
      public void setStealth(double stealth) {
            stealth = stealth;
      }
      public void displayStatus() {
            displayStatus();
            System.out.printf(" Stealth: %d", stealth);
      }
      public toString() {
            return String.format("%s Stealth:%4.1f",
            super.toString(), stealth);
      }
}
```

(8 marks)

(b) Answer the questions below about this class.

```
public class Skier {
        private static final int MAXIMUM_POINTS = 999;
        private String name;
        private int slalomPoints;
        private int giantSlalomPoints;
        private int superGPoints;
        private String ussaNumber;

        public Skier (String name, String ussaNumber) {
              this.name = name;
              this.ussaNumber = ussaNumber;
        }
        public String getBestEvent() {
              if (slalomPoints < giantSlalomPoints) {
                    if (slalomPoints < superGPoints) {
                          return "Slalom";
                    }
                    return "Super G";
              }
              if (giantSlalomPoints < superGPoints) {
                    return "Giant Slalom";
              }
              return "Super G";
        }
}
```

i. What are the names of the instance variables declared in this class?
ii. What are the signatures of the constructors declared in this class?
iii. What are the names of the parameters declared in this class?
iv. What are the signatures of the methods declared in this class?
v. What are the names of the constants declared in this class?

(11 marks)

(c) Given the interface and class definitions from below, what are the methods that you definitely need to implement yourself in class MyClass?

```
interface I {
        public float mI(int a);
}
interface J extends I {
        public int mJ(int a);
        public Object mJJ(int a);
}
class C {
        public void mC(int a) {
        System.out.println(''hello world'');
        }
}
class MyClass extends C implements J {
        ...
}
```

(6 marks)

Question 3

(a) Novice Java programmers often write code similar to,

```
class C { public int x; ... }
...
C[] a = new C[10];
for(int i = 0; i < a.length; i++)
      a[i].x = i;
```

What is the problem with this code? Fix it.

(5 marks)

(b) Write a java program to randomly generate a hexadecimal byte.

(6 marks)

(c) Write a Java program to find if number given is Armstrong number for example 0, 1, 153, 370, 371, 407 etc.
Example:

153 = (1*1*1)+(5*5*5)+(3*3*3)

where:

(1*1*1)=1

(5*5*5)=125

(3*3*3)=27

So:

1+125+27=153

(6 marks)

(d) Identify and explain what are the OOP Principles used in the following program.

```
public abstract class Animal {
        abstract public void MakeVoice();
}
public class Cat extends Animal {
        int LegsNumbers;
        public void MakeVoice() {
              System.out.println("Meow!");
        }
}
public class Dog extends Animal {
        String Color;
        public void MakeVoice() {
              System.out.println("Woof!");
        }

        public void MakeVoice(String c) {
              System.out.println("Wooooooooooof!"+ c);
        }
}
```

(8 marks)

Question 4

(a) The Java API defines the Comparable interface as

```
interface Comparable {
        int compareTo(Object);
}
```

where x.compareTo(y) should return -1 if x is less than y, 0 if they are equal, and 1 otherwise.
Define a class MyArray that implements Comparable and whose objects behave like integer arrays.
MyArrays should be compared based on the sum of their elements. For example,

```
int[] a = new int[] {1,2,3,4}; //create an array and initialize the
elements
int[] b = new int[] {-1,2,-3,4,-5};
MyArray m1 = new MyArray(a); //the elements of m1 are those of a
MyArray m2 = new MyArray(b); //the elements of m1 are those of b
System.out.println(m1.compareTo(m2)); //prints 1, since 1+2+3+4 > -
1+2-3+4-5
```

Define the MyArray class for the above code to work.

(12 marks)

(b) Write a program to find the average of consecutive Odd numbers and Even numbers between 0 and N. N is input given by user.

(9 marks)

(c) Write the output for following program.

```
import java.util.*; // for Arrays class
public class Rectangle {
        int w;
        int h;
        public Rectangle(int width, int height) {
                w = width;
                h = height;
        }
        public String toString() {
                return "w: " + w + ", h: " + h;
        }
}
public class ReferenceMystery {
        public static void main(String[] args) {
                int n = 20;
                int[] a = {40}; // an array with just one element
                Rectangle r = new Rectangle(50, 10);
                mystery(n, a, r);
                System.out.println(n + " " + Arrays.toString(a) + " " +
                r);
        }
        public static int mystery(int n, int[] a, Rectangle r) {
                n++;
                a[0]++;
                r.h++;
                System.out.println(n + " " + Arrays.toString(a) + " " +
                r);
                return n;
        }
}
```

(4 marks)

Question 5

(a) List and explain THREE (3) types of access modifiers?

(9 marks)

(b) What is garbage collecton?

(6 marks)

(c) Given the following code and a file named "data.txt" whose contents are listed below, show what is printed. Assume that all required imports have been defined. If an exception occurs, write the word "exception" for that output line.

```
public class FinalExam4 {
        public static void main(String[] args) {
                int i0 = 2, i1 = 3;
                double d0 = 2.0, d1 = 3.0, d2 = 4.0;
                char c0 = '8', c1 = 'Z';
                String s0 = "", s1 = "";

                try {
                        Scanner scan = new Scanner(new File("data.txt"));
                        d0 = scan.nextDouble();
                        i0 = scan.nextInt();
                        c0 = scan.next().charAt(3);
                        s0 = scan.next();
                        System.out.println(d0 + ": " + i0);
                        System.out.println(c0 + ": " + s0);
                        if (scan.hasNextDouble())
                                d1 = scan.nextDouble();
                        if (scan.hasNextInt())
                                i1 = scan.nextInt();
                        c1 = scan.next().charAt(3);
                        scan.nextLine(); // discard newline
                        s1 = scan.nextLine();
                        System.out.println(d1 + ", " + i1);
                        System.out.println(c1 + ", " + s1);
                        d2 = scan.nextDouble();
                        System.out.println(d2);
                        scan.close();
                } catch (Exception e) {
                        System.out.println("Exception!");
                }
        }
}
```

Here are the contents of the file named "data.txt":
Line 0: 57.31 22
Line 1: Computer Science
Line 2: 332211 1234.5
Line 3: Have a nice summer!
Line 4: double: 468.531

(10 marks)

Question 6

(a) Explain anonymous inner class and give an example code.

(8 marks)

(b) Show the declaration for a method called myMethod that 1) is visible outside the class, 2) can only access class (static) variables, 3) returns an array of integers, and 4) accepts two parameters which are a String and double, in that order.

(5 marks)

(c) Assume that the following four classes have been defined:

```
public class Gala extends Apple {
      public void method1() {
            System.out.print("gala 1 ");
      }
      public String toString() {
            return "gala " +
            super.toString();
      }
}
public class Fruit {
      public void method1() {
            System.out.print("fruit 1 ");
      }
      public void method2() {
            System.out.print("fruit 2 ");
      }
      public String toString() {
            return "fruit";
      }
}
public class Fuji extends Apple {
      public void method1() {
            System.out.print("fuji 1 ");
      }
}
public class Apple extends Fruit {
      public void method2() {
            method1();
            System.out.print("apple 2 ");
      }
      public String toString() {
            return "apple";
      }
}
```

Given the classes above, what output is produced by the following code?

```
Fruit[] elements = {new Gala(), new Fruit(), new Fuji(), new Apple()};
for (int i = 0; i < elements.length; i++) {
      elements[i].method1();
      System.out.println();
      elements[i].method2();
      System.out.println();
      System.out.println(elements[i]);
      System.out.println();
}
```

(12 marks)

--THE END—