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INTERNATIONAL COLLEGE PENANG (507232-U)
LAUREATE INTERNATIONAL UNIVERSITIES

FINAL

(COVER PAGE)

Session	:	April 2014
Programme	:	DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING (DEEI)
Course	:	CSC 2181: OBJECT ORIENTED PROGRAMMING IN JAVA
Date of Examination	:	21 JULY 2014
Time	:	5.00pm – 7.00pm 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.

Materials permitted : Nil

Materials provided : Answer Booklet

Examiner(s) : **Lim Chai Kim**

Moderator : **Koo Lee Chun**

This paper consists of _9__ printed pages, including the cover page.

INTI INTERNATIONAL COLLEGE PENANG

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

CSC2181: OBJECT-ORIENTED PROGRAMMING IN JAVA

FINAL EXAMINATION: APR 2014 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) Specify whether each of the following is a valid or invalid variable name in Java. If invalid, state the reason.

i. a
ii. break
iii. 1counter
iv. _flag
v. *ptr
vi. $amt

(6 marks)

b) Trace the output of the following program:

```
public static void main(String[] args) {
   int j = 1;
   for (int i = 1; i <= 5; i++) {
      switch (i) {
         case 1: j++;
         case 2: j++;
         case 3: j++;
         case 4: j++;
         case 5: j++;
         default: j++;
      }
      System.out.println(i + " " + j + " " + (i + j));
      j=1;
   }
}
```

(5 marks)

c) Explain **ONE (1)** difference between a class and an object. Show example code to support your explanation.

(5 marks)

d) (i)

```
public class MyClass {
    public static int x = 7;
    public int y = 3;
}
```

Based on the code given above explain the difference between class and instance variable.

(4 marks)

(ii) Trace the output of the following code:

```
MyClass myClass1 = new MyClass();
MyClass myClass2 = new MyClass();
myClass1.x=1;
myClass1.y=2;
myClass2.x=3;
myClass2.y=4;
System.out.println("myClass1.x="+myClass1.x);
System.out.println("myClass1.y="+myClass1.y);
System.out.println("myClass2.x="+myClass2.x);
System.out.println("myClass2.y="+myClass2.y);
System.out.println("MyClass2.x="+MyClass.x);
```

(5 marks)

Question 2

a) Trace the output of the following code:

```
int x=4;
System.out.println(x++);
System.out.println(++x);
System.out.println(x);
x+=1;

int y=2;
System.out.println(x+"%"+y+"="+(x%y));
System.out.println(x+"/"+y+"="+(x/y));
System.out.printf("%d/%d=%.2f\n", x, y, (float)x/y);
```

(3 marks)

b) Write a fragment of code to print the following series of numbers using 'continue' and loop control structure.

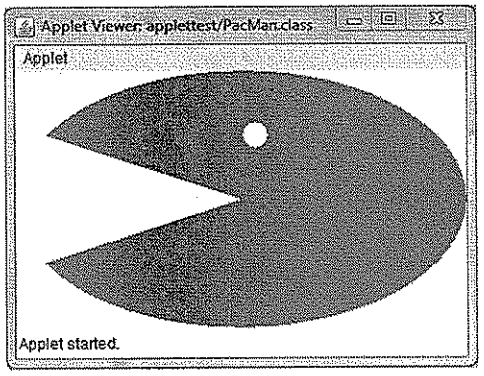
```
1 2 3 5 6 7 8 10
```

(4 marks)

c) List **TWO (2)** possible ways to initialize a 2 dimensional integer array of size [2][3]. Show example code.

(5 marks)

d) Define a class extending javax.swing.JApplet which draws the diagram shown below.



(7 marks)

e) Suppose we have the following class definition:

```
public class Book {
    public String title;
    public boolean borrowed;
}

public class Library {
   public Book[] books;
}
```

Define a method isAvailable(), in class Library, that receives a title and prints whether the title is found in the library and whether it is borrowed.

(6 marks)

Question 3

a) Write a full Java program to get the user's name, and then greet the user by name. Use JOptionPane to display the input dialog box and a separate dialog box to say hello to the user.

(5 marks)

b) Trace the output of the following program:

```
int x=0, y=0;
for (int z = 0; z < 5; z++)
{
    if (( ++x > 2 ) && (++y > 2))
    {
        x++;
    }
    System.out.println(x + " " + y + " " + z);
}
```

(5 marks)

c)

```
public class Vehicle{
    public int currentSpeed;
    public int numOfWheels;
}
```

Complete the class definition above to fulfill the following requirements:

i. Define a constructor for the class above which receives no input parameter and initializes all instance fields to zero.
ii. Add code to show contructor overloading.
iii. Define a public instance method, printProperties(), that will print the currentSpeed and numOfWheels values.

(8 marks)

d) Define a public class, Bus, that extends Vehicle defined in question 3c. Bus has additional public instance field 'hasWifi' of type boolean.

Define the Bus class to show:

i. a constructor that receives **THREE (3)** input parameters. Use the "super" reserved word in the constructor.
ii. method overriding. Rewrite Vehicle if necessary.

(7 marks)

Question 4

a) Name the **TWO (2)** main categories of data types in Java. List **TWO (2)** example data types for each category.

(4 marks)

b) Trace the output of the following program:

```
public class Test {
    public static void main(String args[]) {
        int a=1, b=1, c=1;
        int[] intArr = {1,1,1};
        System.out.println(a + "+" + b + "+" + c +"="+sum(a,b,c));
        System.out.println("a="+a);
        System.out.println(intArr[0] + "+" + intArr[1] + "+" +
                           intArr[2] +"="+sum(intArr));
        System.out.println("intArr[0]="+intArr[0]);
    }
    public static int sum(int x, int y, int z) {
        x = x+y+z;
        return x;
    }
    public static int sum(int[] intArray){
        for(int i=1; i<intArray.length; i++)
            intArray[0]+=intArray[i];
        return intArray[0];
    }
}
```

(4 marks)

c) i) Define a public class RandomGen, with a public static method generateRandomNum(int

min, int max) that will return a random number between min and max (inclusive).

(5 marks)

ii) Test the method created in question 4(c)(i) in the main method of the same class. Simulate the rolling of a die and the throw of a coin. You do not need to write the import statements, just the main method. Here is a sample output of the program:

```
Result of rolling a die (1 to 6): 4
Result of throwing a coin (Head/Tail): Head
```

(5 marks)

d) Draw the output of the following code:

```
public class Java2DExample extends JApplet{
    public void init(){
        setSize(400,400);
    }
    public void paint(Graphics g){
       for(int i=50; i<=getWidth(); i+=50)
        {
            g.drawLine(i, 0, i, getHeight());
            g.drawLine(0, i, getWidth(), i);
            g.fillRect(i-50, i-50, 50, 50);
        }
        g.fillOval(301, 1, 98, 98);
        g.fillOval(1, 301, 98, 98);
    }
}
```

(7 marks)

Question 5

a) Explain what byte code in Java is. Draw a diagram to illustrate the process of compiling and running a Java program.

(6 marks)

b) Trace the output of the following code:

```
char[] copyFrom = {'a', 'b', 'c', 'd', 'e', 'f', 'g', 'h',
                   'i', 'j', 'k', 'l'};
char[][] copyTo = new char[5][5];
for (int i = 0; i < 5; i++) {
    for (int j = 0; j < 5; j++) {
        if (i == 0 || i == 4) {
            copyTo[i][j] = '@';
        } else {
            copyTo[i][j] = '@';
        }
    }
}
for (int i = 0; i < 3; i++) {
    System.arraycopy(copyFrom, i * 3, copyTo[i + 1], 1, 3);
}
for (int i = 0; i < 5; i++) {
    System.out.println(new String(copyTo[i]));
}
```

(5 marks)

c) Assume you have written some classes. Lately, you decided they should be splitted into three packages, as listed in the following table. Furthermore, assume the classes are currently in the default package (they have no package statements).

Destination Packages	
Package Name	Class Name
mygame.server	Server
mygame.shared	Utilities
mygame.client	Client

i) Which line of code will you need to add to each source file to put each class in the right package? What is the line of code to be added in each file?

(4 marks)

ii) To adhere to the directory structure, you will need to create some subdirectories in the development directory and put source files in the correct subdirectories. What subdirectories must you create? Which subdirectory does each source file go in?

(3 marks)

iii) If the Server class needs to use the Client class, do you need to make any other changes to the source file, Server.java, to make it compile correctly? If yes, describe all the possible changes?

(4 marks)

d) Describe **ONE (1)** difference between checked and unchecked exceptions. List **TWO (2)** checked exceptions in Java.

(3 marks)

Question 6

a) Write **ONE (1)** executable statement to print the following **TWO (2)** lines of text:

```
The file "C:\data.txt" could not be found.
Program exits.
```

(3 marks)

b) Trace the output of the following code:

```
public class Test {
    public static void main(String args[]) {
        methodA("ape bat cat dog");
    }

    public static void methodA(String str) {
        String[] words = str.split(" ");
        for(int i=0; i<words.length; i++)
        {
            String firstChar = words[i].charAt(0)+"";
            System.out.print(firstChar.toUpperCase());
            if(i<words.length-1)
                    System.out.print(""-"");
        }
        System.out.println();
    }
}
```

(4 marks)

c) Identify and describe **FOUR (4)** syntax errors from the following code. Describe how the error can be fixed.

```
1 public class Test{
2     public static void main(String[] args){
3        while(1){
4            testmethod(2);
5        }
6     }
7     public static int testMethod(int x){
8         for(i=0; i<x; i++)
9             System.out.println("A");
10     }
11 }
```

(6 marks)

d) i) Complete code A and code B below:

```
public interface Shape {
   public double calculateArea();
}

public class Square implements Shape{
   public int length;
   //code A
}

public class Circle implements Shape{
   public int radius;
   //code B
}
```

Formula:
Area of square = length * length
Area of circle = PI * radius * radius

(3 marks)

ii) Complete the code below to be able to print the areas of any shape (circle or square) in the given array of Shape (defined in question 6di above). Print the area in two decimal places.

```
public class ShapeUtilities{
    public static void printAreas(Shape[] shapes){
        //code C
        //prints the area of each shape in the 'shapes' array
    }
}
```

(3 marks)

iii) Name the OOP concept used in the printAreas() method that allows it to print the areas of multiple shapes.

(1 marks)

iv) Write a main method within ShapeUtilities to call the printAreas() method in Question 6dii above. The array you pass to the method should contain a Circle and a Square object. Hardcode the radius and length of the circle and square to 3.

(5 marks)

--THE END—