STIA1014

CONFIDENTIAL

UUM
Universiti Utara Malaysia

FINAL EXAMINATION
FIRST SEMESTER SESSION 2012/2013

COURSE CODE / NAME : STIA1014 INTRODUCTION TO PROGRAMMING
DATE : 29 DECEMBER 2012 (SATURDAY)
TIME : 2.30 P.M. ~ 5.00 P.M. (2 ½ HOURS)
VENUE : DSB K. TM, KYM, KISDAR

INSTRUCTIONS :
1. This exam paper contains THREE (3) sections in FOURTEEN (14) printed pages, excluding the cover page.
2. Section A contains TEN (10) multiple choices questions. Section B contains NINE (9) structured questions. Section C contains TWO (2) case study questions.
3. You are required to answer ALL questions on the exam paper.

MATRIC NO : ____________________________   ( with word )   ____________________________   ( with number )
IDENTIFICATION CARD NO. :

LECTURER : ____________________________

GROUP :   TABLE NO. : ____________________________

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CONFIDENTIAL
STIA1014 Introduction to Programming

SECTION A: MULTIPLE CHOICE QUESTIONS (10 MARKS)

Instruction: Circle the correct answer.

1. A ___________ translates high-level language statements into machine code.
   a. programmer
   b. syntax detector
   c. compiler
   d. decipherer

2. A ___________ occurs when a program produces a wrong output during execution.
   a. logical error
   b. syntax error
   c. runtime error
   d. compile error

3. After you write and save a Java application file, you ___________ it.
   a. interpret and then compile
   b. interpret and then execute
   c. compile and then resave
   d. compile and then interpret

4. Assuming that x is 1, show the result of the following expression:
   \((x \neq 0) \lor (x = 0)\)
   a. true
   b. false
   c. 0
   d. 1
5. Given:

```java
int i=1;
while (i<6){
    if (i%2==0)
        System.out.print("i + ");
    i++;
}
```

What is the output?

a. 12345  
b. 135  
c. 246  
d. 24

6. Overloaded methods must have the same _________.

   a. name  
   b. number of parameters  
   c. parameter names  
   d. types of parameters

7. Given the declaration:

   ```java
   int[][] values = new int[10][10];
   ```

   which is the CORRECT statement to assign the integer 10 into the element of the array at the 5th column and 7th row?

   a. values[5][7] = 10;
   b. values[7][5] = 10;
   c. values[4][6] = 10;
   d. values[6][4] = 10;

8. Java subclasses have the ability to inherit from ________ parent class(es).

   a. one  
   b. two  
   c. multiple  
   d. zero
9. If you include three statements in a try block and follow the block with three catch blocks, and the second statement in the try block throws an Exception, then ____________.

a. the first catch block executes  
b. the first two catch blocks execute  
c. only the second catch block executes  
d. the first matching catch block executes

10. ____________ contain data that have been encoded using a scheme such as ASCII or Unicode.

a. Data files  
b. Text files  
c. Binary files  
d. Computer files
SECTION B: STRUCTURED QUESTIONS (60 MARKS)

**Instruction:** Answer ALL questions in the space provided.

1. a) What is the type of the result if you attempt to add a float, an int, and a byte? Does this relate to explicit casting or implicit casting? (2 marks)

   b) What is the value of variable nom after this statement is executed?
   \[ \text{int nom = 8 \% 5 * 3 + 4 / 2 - 1;} \] (2 marks)

   c) State THREE (3) compile-time errors in the following program. Assume all required classes have been imported.

   ```java
   public class HasErrors {
     public static void main(String[] ar) {
       Scanner in = new Scanner(System.in);
       System.out.print("Please enter a number");
       x = in.readDouble();
       int y = x + 2.35;
       System.out.print("The sum is "+ y);
     }
   }
   ``` (3 marks)
2. Change the switch-case codes below to nested if-else statements:

```java
switch (grade)
{
    case 'A': System.out.println("The grade is A."); break;
    case 'B': System.out.println("The grade is B."); break;
    case 'C': System.out.println("The grade is C."); break;
    default: System.out.println("The grade is invalid.");
}
```

(5 marks)

3. Write a complete for loop statements that can display all integers from 1 to 100 that can be divided by 5.

(5 marks)
4. Briefly explain the error(s) in the following codes:

a)
```java
public class ShowErrors {
    public static void main(String[] args) {
        ShowErrors t = new ShowErrors(5);
    }
}
```

(2 marks)

b)
```java
public class ShowErrors {
    public static void main(String[] args) {
        ShowErrors t = new ShowErrors();
        int y = t.x();
    }
    public void x() {
    }
}
```

(2 marks)

c)
```java
public class Test {
    private int count;
    public static void main(String[] args) {
        System.out.print(count);
        m1();
    }
    public void m1() {
        count = 100;
    }
}
```

(3 marks)
5. a) Analyze the following program:

```java
public class Test1 {
    public static void main(String[] args) {
        int[] a = new int[3];
        for (int j = 0; j < a.length; j++) {
            a[j] = a[0] + 1;
            System.out.println(a[j]);
        }
    }
}
```

What is the output?  

(3 marks)

b) Given is the following array declaration:

```java
String[] sign = ("Fire", "Earth", "Water");
```

i) Write **ONE (1)** Java statement to print the length of the string which is located at the second element of the array.  

(2 marks)

ii) Write **ONE (1)** Java statement to combine the first element of the array with the string "Fox" and assign the combined string as the third element of the array.  

(2 marks)
6. a) Suppose Subway class is the child of the Sandwich class:

```
Sandwich x = new Sandwich();
Subway y = new Subway();
```

State whether each of the following statements is LEGAL or NOT: (2 marks)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Legal / Illegal</th>
</tr>
</thead>
<tbody>
<tr>
<td>x = y;</td>
<td></td>
</tr>
<tr>
<td>y = x;</td>
<td></td>
</tr>
<tr>
<td>y = new Sandwich();</td>
<td></td>
</tr>
<tr>
<td>x = new Subway();</td>
<td></td>
</tr>
</tbody>
</table>

b) State the MOST accurate accessibility modifier that matches each of the following situations: (2 marks)

<table>
<thead>
<tr>
<th>Situation</th>
<th>Modifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>A class named Vehicle allows any of its child classes to access it members as long as they are in the same package as it is.</td>
<td></td>
</tr>
<tr>
<td>A class named Animal allows all of its child classes to access it members.</td>
<td></td>
</tr>
</tbody>
</table>

c) Given below is the correct definition for a class named Coupe, which is a child of Car class:

```java
class Coupe extends Car {
    public Coupe() {
        super();
        System.out.println("This is a Coupe");
    }  

    public void speedup() {
        System.out.println("Vroom Vroom!");
    }
}
```

Is it necessary for the Car class to define it own constructor? State your reason. (2 marks)
d) Referring to (c) in the previous page, suppose that class Car is an abstract class and has an abstract method named speedUp(), which is overridden by class Coupe. Write the CORRECT definition of the method speedUp() in class Car.

(2 marks)

7. Consider the following Java code:

```java
Scanner read = new Scanner(System.in);
int num = 0, sum = 10;
try {
    num = read.nextInt();
    System.out.println("Starting");
    sum = sum / num;
    if (sum == 5)
        throw new Exception("Lower limit error");
    System.out.println("Stopping");
} catch (ArithmeticException ex) {
    sum = sum / 10;
    System.out.println("Cannot Compute");
} catch (Exception ex) {
    System.out.println("An Exception occurs.");
} finally {
    if (sum <= 0) sum = 100;
}
System.out.println("Sum = "+sum);
```

a) What is the output of this code if the user inputs a string “one”? (2 marks)

b) What is the output of this code if the user inputs an integer 0? (3 marks)
c) What is the output of this code if the user inputs an integer 1? (3 marks)

8. a) Name **TWO (2)** Java classes that are used for writing text files and **TWO (2)** Java classes for reading binary files. (4 marks)

b) A binary file named `sample1.data` contains one integer number and one float number. The following incomplete codes read both numbers from the file, add them and print the result of the addition. Fill the incomplete parts with the correct Java codes. (4 marks)

```java
File inFile = new File("sample1.data");
FileInputStream inStream = new FileInputStream(_________);

DataInputStream inData = new FileInputStream(_________);

int num1 = inData.___________;

float num2 = inData.___________;

double result = num1 + num2;
System.out.println("Result = " + result);
```

9. Why do you need to use layout managers? List **THREE (3)** types of layout managers. What is the default layout manager for a frame? (5 marks)
SECTION C: CASE STUDY (30 MARKS)

Instruction: Answer ALL questions in the space provided.

1. A telecommunication provider, Maxcom, charges the following rates for telephone calls:

<table>
<thead>
<tr>
<th>Rate Category</th>
<th>Rate per Minute (RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Daytime)</td>
<td>0.07</td>
</tr>
<tr>
<td>2 (Evening)</td>
<td>0.12</td>
</tr>
<tr>
<td>3 (Off-Peak)</td>
<td>0.05</td>
</tr>
</tbody>
</table>

You are assigned by Maxcom to write a program that can calculate the charge for a call made by the user. The user needs to enter the duration in minutes of the call and the rate category. The program will then display output containing the rate category, the duration and the calculated charge. Then, the program will ask whether the user want to continue with the next calculation or quit the program. If the user chooses to continue, the program will repeat again with a new calculation. An example of the program running is as follows:

Enter the call duration (in minutes):
40
Enter Rate Category: 1.Daytime 2.Evening 3.Off-Peak
2
The amount you have to pay is = RM4.80
Do you want to continue? 1.Yes 2.No
1

Enter the call duration (in minutes):
30
Enter Rate Category: 1.Daytime 2.Evening 3.Off-Peak
3
The amount you have to pay is = RM1.50
Do you want to continue? 1.Yes 2.No
2
Thank you! See you again.

Note: The underlined values above are entered by the user.

In the following page, you are given TWO (2) incomplete classes:
i) MaxcomApp – the class representing the program.
ii) CallChargeCalculator – the class definition for CallChargeCalculator object to be used in MaxcomApp.

You have to complete both classes based on the given information. (15 marks)
public class CallChargeCalculator {
    double charge;

    public double computeCharge(int duration, int category) {
        double rate;
        if (_________ == 1) {
            rate = ______;
        } else if (_________ == 2) {
            rate = ______;
        } else {
            rate = ______;
        }
        charge = ________________;
        return charge;
    }
}

import java.util.Scanner;

public class MaxcomApp {
    public static void main(String[] args) {
        int duration, category;
        Scanner _______ = new Scanner(System.in);
        double charge = 0.0;
        int respond;
        CallChargeCalculator ccc = new ________________;
        do {
            System.out.println("Enter the call duration (in minutes): ");
            _______ = read.nextInt();
            System.out.println("Enter Rate Category: 1. Daytime  2. Evening 3. Off-Peak");
            _______ = read.nextInt();
            charge = ccc.____________________(______, _______);

            System.out.printf("The amount you have to pay is = RM___%n", charge);
            System.out.println("Do you want to continue? 1. Yes  2. No");
            respond = read.nextInt();
            System.out.println();
        } while (______________);
        System.out.println("Thank you! See you again.");
    }
}
2. ABC Company runs a small factory. The company employs workers who are paid hourly rates depending on the following skill levels:

<table>
<thead>
<tr>
<th>Skill Level</th>
<th>Hourly Pay Rate (RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17.00</td>
</tr>
<tr>
<td>2</td>
<td>20.00</td>
</tr>
<tr>
<td>3</td>
<td>22.00</td>
</tr>
</tbody>
</table>

Each factory worker might work any number of hours per week. If he/she works more than 40 hours, overtime rate will be paid. Overtime rate is RM30.00 for every hours above 40.

In the figure below is the GUI for the ABC Company payroll application that calculates the salary for a factory worker based on the skill level and hours worked.

The user must enter the number of hours worked (an integer) in a text field (named `hoursTF`) and selects the worker’s skill level. The selection is done by clicking the respective radio buttons (refer to figure for their names) associated with the skills as shown in the figure. Finally, when the user clicks the `Calculate` button (named `calcBtn`) the program will display the output containing the number of hours worked, the skill level and the calculated salary in the text area (named `outputTA`). If the input for hours worked is invalid (e.g. not numeric such as strings), display an error message in the text area. To do this, you must handle the exception that can be thrown as a result of the invalid input.

Based on the description given, write the event-handling method for `Calculate` button, `calcBtn`. Note: To get the user-selected radio button you can use ` isSelected()` method.

(15 marks)
private void btnCalActionPerformed(ActionEvent evt) {

}