Rajarata University of Sri Lanka
Faculty of Management Studies, Mihintale

2018, B.Sc. (Business Information Technology) Special Degree

ITM 2133 - Introduction to Programming
Special Assignment

Due Date: 03.06.2021
No. of Questions: 06
No. of Pages: 05

Instructions:

- You have to answer four questions from question number one to five and answers shall be well typewritten.
- Question number six is compulsory for all the students and you have to implement the program using java.
- The answer file for questions one to five shall in *pdf* file and answer files for question six shall in *java* files.
- Put all the answer files into a folder named *MGT_2018_XXX* where *XXX* indicates last three digits of your registration number and upload *zip* file to given location in LMS.
- You are highly recommended to submit the answer file on or before the examination date of this subject.

Q1.

i. What is mean by a computer program? Briefly discuss on three basic steps of a computer program with a proper example.

[05 Marks]

ii. Discuss on the role of programming language. What is meant by Low Level programming languages and High Level programming languages. Provide an example for each.

[04 Marks]

iii. Describe the terms Interpreting and Compiling.

[03 Marks]

iv. Briefly explain on terms Syntax and Semantics.

[03 Marks]

v. Write a simple java program to pass your name as a command line argument and print it on screen. Indicate the steps to save, compile and run the above program.

[05 Marks]

[Total 20 Marks]

Q2.

i. Name an appropriate primitive data type to represent each of the following and demonstrate each by declaring variable and assigning value.

a) The number of students in a school
b) The average marks of a student for an exam
c) The response of a user asked to type 'y' to continue or 'n' to quit
d) Whether or not a student is passed the exam

[06 Marks]

ii. Briefly explain on implicit and explicit type conversion by indicating necessary conditions for each.

[04 Marks]

iii. Rewrite following statements by considering short forms use in java programming.

a) sum = sum + 5;
b) count = count + 1;
c) answer = answer % 3;
d) age = age * 2;

[02 Marks]

iv. Evaluate the following java expressions, assuming x and y are both declared as integer variables and x = 13 and y = 4.

a) x / y + 3 = ?
b) x % y * 4 = ?
c) x – y / 3 = ?
d) x / 6 – y * 2 = ?

[04 Marks]

v. What is the output data type of relational operations? Use relational operators and rewrite following expressions.

a) no_of_legs equal to no_of_hands
b) days_for_week not equal to months_for_year
c) mass_of_lorry greater than mass_of_car
d) lifetime_of_elephant less than or equal to lifetime_of_toties

[04 Marks]

[Total 20 Marks]

Q3.

i. Write a java program to fulfill the following requirement.

There are two integer variables called num_01 and num_02. Value of num_01 shall be increased by 5 if num_01 is greater than or equal num_02 and value of num_01 is less than 3. Finally, the value of num_01 shall be displayed on the screen.

[05 Marks]

ii. Write a java switch statement that implements the table below, where mark is an integer variable and grade is a string variable. Both variables have been declared and mark has been initialized to a value between 0 and 10.

If **mark** is:	Set **grade** to:
10, 09, 08	Distinction
07, 06	Very Good Pass
05, 04	Credit Pass
03, 02	Ordinary Pass
< 02	Failure

[05 Marks]

iii. Rewrite the following method using a while loop instead of a for loop.

```
public static int triangularNumber(int n) {
        int triNum = 0;
        for (int i = 1;i <= n;i++) {
                triNum = triNum + i;
        }
        return triNum;
}
```

[05 Marks]

iv. For each of the following loops, say how many asterisks (*) will be printed.

a) int i = 0; while(i <= 3) { System.out.println("*"); i++}
b) int i = 10; while(i > 4) { System.out.println("*"); i--}
c) int i = 2; do{ System.out.println("*"); i++} while(i < 7);
d) for(int i = 0;i < 5;i++) System.out.println("*");
e) for(int i = -2;i < 6;i++) System.out.println("*");

[05 Marks]

[Total 20 Marks]

Q4.

i. Declare and define an array called months that can store twelve (12) string variables and set the 1st, 4th, 6th, 8th and 11th elements of the array as "January", "April", "June", "August" and "November" respectively.

[05 Marks]

ii. Declare and define an array called 'capitalLetters' that can store twenty-six (26) character variables.

[03 Marks]

iii. Initialize above array with English alphabetical capital letters without using any alphabetical character (Hint: ASCII value of character 'A' is 65).

[04 Marks]

iv. Create and initialize an array with following values.

12	-43	6	83	14	-57	109	-18	0	63

[03 Marks]

v. Write a java code to find the smallest value in above array and the location in which you found it.

[05 Marks]

[Total 20 Marks]

Q5.

i. Consider the following section from the definition of class Car.

```
public class Car {
        public int gear;
        private double speed;
        protected String brand;

        public Car(int startGear) {
                this.gear = startGear;
        }

        protected boolean isRide( ) {
                ...
        }

        public void setGear(int newValue) {
                gear = newValue;
        }

        public double speedUp(double increment) {
                speed += increment;
                return speed;
```

```
    }

    private double applyBrake(double decrement) {
        ...
    }
}
```

a) Which members are only visible to (accessible from) Car and its subclasses?
b) Which members are only visible to (accessible from) the Car class?
c) Which members are visible to (accessible from) any class?

[03 Marks]

ii. Which field(s) should we write getter(s) and setter(s) to access it (them) in classes outside *Car* and its inheritance hierarchy?

[02 Marks]

iii. Write a constructor for the *Car* class that will make the following statement in the main method to be legal.

```
Car c = new Car (2, 15.25, Audi);
```

[02 Marks]

iv. Implement the *applyBrake* method in above class.

[03 Marks]

v. Create a subclass call *RacingCar* that will inherit by *Car* class.

[02 Marks]

vi. Write a constructor for the *RacingCar* class that will make the following statement in the main method to be legal (Hint: super keyword).

```
RacingCar rc = new RacingCar (5);
```

[02 Marks]

vii. Override the *speedUp* method inside the *RacingCar* such a way that speed is increased by twice the increment value.

[03 Marks]

viii. Write a test class and create an instance of *RacingCar* with *Car* reference.

[03 Marks]

[Total 20 Marks]

Q6. Implement a complete java application by answering following questions.

i. Declare a class called *Solid*.

[01 Mark]

ii. Declare a string variable called *color* which is common to all solids.

[01 Mark]

iii. Write a constructor that can create an object type of *Solid* by providing color of specific solid figure.

[01 Mark]

iv. Write an abstract method called *volume* inside the above class.

[01 Mark]

v. Create a subclass of *Solid* called *Cuboid*.

[01 Mark]

vi. Write a constructor that can create an object type of *Cuboid* by providing length, width and height of specific cuboid.

[02 Marks]

vii. Write another constructor that can create a cube as an instance of *Cuboid*.

[01 Mark]

viii. Override the method *volume* inside the class *Cuboid*.

[02 Marks]

ix. Create another subclass of *Solid* called *Sphere*.

[01 Mark]

x. Write a constructor that can create an object type of *Sphere* by providing radius of specific sphere.

[02 Marks]

xi. Override the method *volume* inside the class *Sphere*.

[02 Marks]

xii. Write a test class for Solid called *TestSolid*.

[01 Mark]

xiii. Create an instance of a Cuboid with following dimensions inside the class *TestSolid*.

- length = 5.2
- width = 3.5
- height = 2.7

[01 Mark]

xiv. Create a cube with length of an edge equal to 4.6 as an instance of *Cuboid*.

[01 Mark]

xv. Inside the class *TestSolid* create an instance of a *Sphere* where radius is 5.25.

[01 Mark]

xvi. Find the volume of above three objects using the *volume* method you have written and display the result to the user.

[01 Mark]

[Total 20 Marks]

Note:

$Volume\ of\ a\ Cuboid = length \times width \times height$

$Volume\ of\ a\ Sphere = {}^{4}/_{3} \times \pi \times radius^{3},\ (\pi = 3.14)$

Cube is a special instance of a cuboid where length of every edge is equal