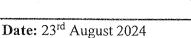THE OPEN UNIVERSITY OF SRI LANKA
BSc (IT) DEGREE PROGRAMME: LEVEL 03
FINAL EXAMINATION: 2023/2024
COU3304: FUNDAMENTALS OF PROGRAMMING
DURATION: TWO HOURS (2 HOURS)

0295

Date: 23rd August 2024   **Time:** 2.00 pm – 4.00 pm

Answer FOUR questions ONLY.
Each question carries equal marks.

Q1.

(i) Briefly explain three (03) advantages of *Java programming language*? [03 marks]

(ii) Determine whether the following statements are true or false. **If it is false,** briefly explain the reason.

    (a) Java is a platform-dependent programming language.

    (b) Java is architecture-neutral.

    (c) Java is exactly same as C programming language.

    (d) Java is a 'static' programming language. [04 marks]

(iii) Differentiate between *Command line environment* and *Integrated development environment* in Java. [05 marks]

(iv) What is meant by *Java virtual machine*? [03 marks]

(v) Write the output of the following Java programme,

```java
import java.util.Scanner;

public class Student {
    public static void main(String[] args) {
        String name = "Kamala Fernando";
        char[] letters = name.toCharArray();

        for (int i = letters.length - 1; i >= 0; i--)
        {
            System.out.print(letters[i]);
        }
    }
}
```
[10 marks]

Q2.

(i) What are *primitive data types* in Java? Briefly explain four (04) of them using an example for each. [04 marks]

(ii) What are *identifiers* in Java? Find all the identifiers that are in the following programme.

```
public class Test{
        public static void main(String[] args) {
                int number = 20;
        }
}
```
[06 marks]

(iii) Name three (03) main types of *variables*. Give two (02) characteristics for each variable type. [06 marks]

(iv) *Primitive data types* in Java can be *cast* in two (02) ways. Briefly explain them. [04 marks]

(v) Write the output of the below Java programme segment.

```
double myDouble = 108.5d;
int myInt = (int) myDouble;
System.out.println(myDouble);
System.out.println(myInt);
```
[05 marks]

Q3.

(i) What are the three (03) types of control flow statements in java. [03 marks]

(ii) Briefly explain the roles of *initialization, condition, increment/decrement* and *statement* within a `for loop` in Java programming.
[04 marks]

(iii) What is a nested `for` loop in Java? Provide an example. [05 marks]

(iv) What would be the output of the following programme segment?

```
for ( int i = 1; I <= 5; i++) {
        System.out.println ("Number: "+ i);
}
```
[06 marks]

(v) What would be the output of the following program segment?

```
for (;;) {
        System.out.println (" Loop");
}
```
[07 marks]

Q4.

(i) What is the difference between a *single dimensional array* and a *multidimensional array* in Java? Briefly explain. [06 marks]

(ii) You are asked to develop a simple inventory management system for a grocery store using Java. The store has three categories of products, each with four products. You need to create a program to fulfil the following requirements given in questions (a) and (b),

(a) *Create a 2D array* to represent the inventory. The array should have 3 rows and 4 columns. Initialize the array with product names as follows:

- *Category 1* - Oranges, Grapes, Blueberries, Lemons
- *Category 2* - Cereal, Yogurt, Ham, Jam
- *Category 3* - Salmon, Tofu, Turkey, Shrimp

Add a comment as "Initializing inventory with product names"   [12 marks]

(b) Write a programme segment to display the entire inventory. Each row of the array represents a product category, and each column represents a product within that category. Add a comment as "Print inventory".   [07 marks]

Q5.

(i) What are the four types of *access modifiers* in Java?   [04 marks]

(ii) Briefly explain the difference between the *instance methods* and *static methods*.   [05 marks]

(iii) What would be the output of the following program segment?

```
public class DirectR{
    public static void main(String[] args){
        directR(5);
    }
    static void directR(int n) {
        if (n > 0) {
            System.out.println(n);
            directR(n-1);
        }
    }
}
```
    [06 marks]

(iv) Write a Java program with a method named `getAverage` that accepts three floating point numbers as arguments and returns its average.

Call this method from `main( )` method.

Write a method named `printAverage` to print the average of three numbers.   [10 marks]

Q6.

(i) What is meant by *recursions* in java?   [06 marks]

(ii) What are the two (02) types of recursions? Briefly explain using an example.   [07 marks]

(iii) Write a Java recursive method named `calculateSum` to calculate the sum of all numbers from 1 to n.   [12 marks]

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