

UNIVERSITY OF RUHUNA

BACHELOR OF SCIENCE (GENERAL) DEGREE LEVEL I (SEMESTER I)
EXAMINATION – JUNE 2023

SUBJECT: Computer Science

COURSE UNIT: COM1123 – Programming Techniques

Time: 2 hours

Answer all four (04) questions.

1)

a)

- i. Name the three (03) types of errors in programming.
 - ii. Java Programming language uses rules for defining identifiers. Explain two (02) of them briefly.
- b) Write the following mathematical expressions in Java syntax. Variable declarations are not needed.

i. $a = \frac{b}{\sqrt{1-c^2}}$

ii. $y = x^n + (1 + p)^{\frac{1}{n}}$

- c) Using the given declarations and initializations, evaluate the following expressions.

int a=5, b=2, c=3, d=4;

- | | |
|---|-------------------|
| i. $a \% 5 + a / b$ | iv. $d++ * a - b$ |
| ii. $((a >= b) \ \ (b != 2)) \ \&\& \ (c < a)$ | v. $++b + b++$ |
| iii. $! (--c > b) \ \&\& \ (a == d)$ | |

d)

- i. Write the exact output produced by the following Java program.

```
public class Test {  
    public static void main(String[] args) {  
        int c, d = 0;  
        int a = 1234;  
        int b = 0;  
        while(a>0) {  
            c = a % 10;  
            d = d * 10 + c;  
            a = a / 10;  
        }  
        System.out.println(d);  
    }  
}
```

- ii. To get the sum of all the digits in the number **1234** as the output, what change needs to be done in the above code.

2)

a)

- What role does the main method play in a Java program?
- Explain the purpose of using comments in a Java program and how the three (03) different types of comments are written in Java.

b)

- Explain the difference between a while loop and a do-while loop.
- Rewrite the following Java code by using a for loop.

```
int i = 0;
int j = 0;
while (j < 12 && i < 24) {
    System.out.println(i + " " + j);
    i += 3;
    j += 2;
}
```

c) Write a Java program to implement the algorithm shown in the following flowchart in **Figure 2.1**.

d) Write a java program which takes the maximum speed of a moving vehicle as an integer from keyboard input and output the possible type of vehicle. The possible vehicle types for speed ranges are given in the following table.

Speed (kmph)	Vehicle Type
131 – 160	Motorcycle
101 – 130	Car
71 – 100	Bus
41 – 70	Tuk Tuk
Other ranges	Cannot identify

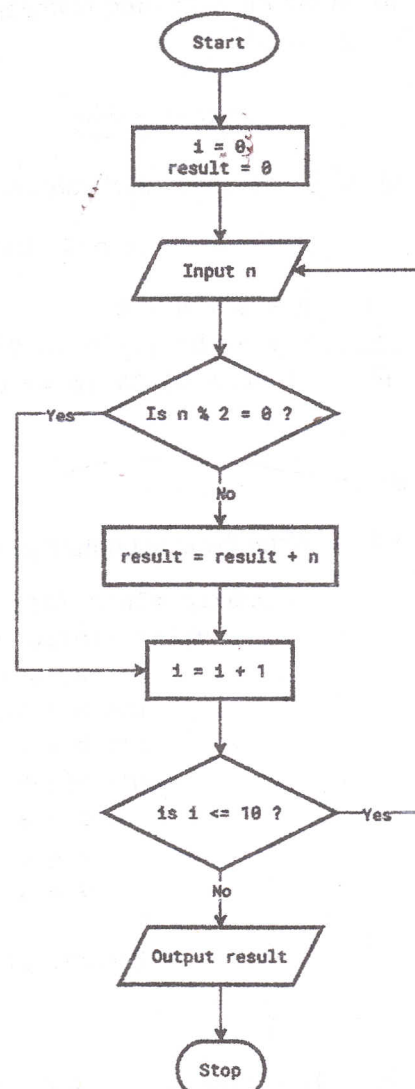


Figure 2.1

3)

a) Show three (03) statements.

b)

- Write three statements.
- Write two statements.

c)

i. Write three statements.

1
2
3
4
5
6
7
8
9

ii.

3)

a) Show three (03) ways of creating an integer array in Java using example java code statements.

b)

i. Write three (03) advantages of using methods in Java.

ii. Write two (02) features of Java constructors.

c)

i. Write the output of the following Java program.

1	import java.util.Scanner;
2	class Test {
3	public static void main(String[] args) {
4	int[] a = {2,3,4};
5	int[] b = {1,4,7};
6	int result = 0;
7	for(int k = 0; k < a.length; k++)
8	result += a[k]*b[k];
9	System.out.println("Result = " + result);
10	}
11	}

ii. What is the content of the array **data** after executing the following code segment.

```
int[] data = {7,1,4,9,3};
for(int index = 0; index < data.length/2; index++) {
    int temp = data[index];
    data[index] = data[data.length - 1 - index];
    data[data.length - 1 - index] = temp;
}
```

d) Refer to the following incomplete program and answer the questions.

```
class Circle {
    private static final double PI = 3.14;
    private double radius;

    public Circle() {
        radius = 1; // default radius
    }

    public Circle(double newRadius) {
        // code block ①
    }

    public void setRadius(double newRadius) {
        radius = newRadius;
    }

    public double area() {
```

```

        double circleArea;
        circleArea = PI * radius * radius;
        return circleArea;
    }

    public double getRadius() {
        return radius;
    }
}

public class TestCircle {
    public static void main(String[] args) {
        Circle c1 = new Circle();
        // code block ②
        // code block ③
        // code block ④
        // code block ⑤
        // code block ⑥
    }
}

```

- i. Write eight (08) reserved keywords in the above program.
- ii. Write the names of the classes used in this program.
- iii. How many constructors are there in the above program?
- iv. Write the Java statements corresponding to each code block mentioned in the above program according to the following requirements.

BLOCK 1. Complete the constructor body.

BLOCK 2. Create another circle object named as *c2* with radius 10.

BLOCK 3. Set the radius of the circle object *c1* as 7.

BLOCK 4. Display the area of the circle object *c1*.

BLOCK 5. Display the radius of the new circle object *c2*.

BLOCK 6. Display the area of the new circle object *c2*.

- v. What are the reference variables in the final completed program?

4)

a)

- i. Write three (03) principles of Object-Oriented Programming paradigm.
- ii. Write two (02) differences between a static method and a non-static (instance) method in Java.

b)

- i. Show three (03) ways of creating a string in Java.
- ii. Write names of the methods (name only) found in the String class in java that help to do each of the following tasks.

- To read the character at a given index in a string.
- To compare two strings with each other.
- To return the uppercase version of a string.

c)

- i. Write the output produced by the following Java program.

```
class Test {
    public static void main(String[] args) {
        String s1 = "bun";
        int k = 2;
        char[] chars = s1.toCharArray();
        for(int n = 0; n < chars.length; n++) {
            chars[n] += k;
            k += 1;
        }
        String s2 = new String(chars);
        System.out.println(s2);
    }
}
```

- ii. To get the output as **dwp**, what change needs to be done in the above code.

- d) Take the code segments from Code Segment List given below and place them into the blank lines in the following code. Your goal is to make a class that will produce output shown in the table given below.

You are required to write only the blank line number and the correct java statement [e.g., blank line number → statement].

```
class Test {
    ..... ① .....
    ..... ② .....
    ..... ③ .....
    ..... ④ .....
    int max = ..... ⑤ .....
    ..... ⑥ .....
    sum += marks[i];
    ..... ⑦ .....
    ..... ⑧ .....
}
..... ⑨ .....
System.out.println("Max: " + max);
..... ⑩ .....
}
}
```

Code Segment List	Output
marks[length - 1];	Max: 90
max = marks[i];	Avg: 43.0
double average = 1.0 * sum / length;	
int[] marks = {60,10,30,5,90,70,20,80,40,25};	
System.out.println("Avg: " + average);	
for(int i = length - 1; i >= 0; i--) {	
public static void main(String[] args) {	
int sum = 0;	
int length = marks.length;	
if(max < marks[i])	

*** THE END ***