Instructions to submit the Lab Report-5

- **The report should contain a title page showing LAB Report-5, your name and registration number.**
- **Include source code of Lab Activities along with output screenshots in the report**
- **Submit the report in the PDF format on MS Teams**

You must also upload java source files for each activity on MS Teams.

Selection/Conditional Statements

Topics: Formatting Console Output; Relational Operators; Logical Operators; Boolean Data Type; One-Way If Statement; Two-Way If Statement; Nested If Statement; Multi-way If Statement; Conditional Operators; Switch Statement

Formatting Console Output

Activity-1

Consider the statements:

double x = 75.3987;

double y = 982.89764;

What is the output of the following statements?

    a. System.out.printf("%.2f %n", x);
    b. System.out.printf("%.2f %n", y);
    c. System.out.printf("%.3f %n", x);
    d. System.out.printf("%.3f %n", y);

Activity-2

Show the output of the following statements.

    a. System.out.printf("amount is %f %e\n", 32.32, 32.32);
    b. System.out.printf("amount is %5.2%% %5.4e\n", 32.327, 32.32);
    c. System.out.printf("%6b\n", (1 > 2));
    d. System.out.printf("%6s\n", "Java");
    e. System.out.printf("%-6b%s\n",(1 > 2), "Java");
    f. System.out.printf("%6b%-8s\n",(1 > 2), "Java");

Activity-3

What is wrong in the following statements?

    a. System.out.printf("%5d %d", 1, 2, 3);
    b. System.out.printf("%5d %f", 1);
    c. System.out.printf("%5d %f", 1, 2);

Activity-4

Write JAVA statements using System.out.prinf() statement to display output as given below

```java
public class DemoFormat {
  public static void main(String[] args) {
    // Display the header of the table using System.out.printf()

    int degrees = 30;
    double radians = Math.toRadians(degrees);
    double sin = Math.sin(radians);
    double cos = Math.cos(radians);
    double tan = Math.tan(radians);
    // Display the Data of the table using System.out.printf()

    degrees = 60;
    radians = Math.toRadians(degrees);
    sin = Math.sin(radians);
    cos = Math.cos(radians);
    tan = Math.tan(radians);

    // Display the Data of the table using System.out.printf()
  }
}
```

Degrees	Radians	Sine	Cosine	Tangent
30	0.5236	0.5000	0.8660	0.5773
60	1.0472	0.8660	0.5000	1.7320

Relational Operators; Logical Operators; Boolean Data Type;

Activity-5

Suppose that x, y, and z are int variables and x = 10 , y = 15 , and z = 2 0. Determine whether the following expressions evaluates to true or false .

   a. !(x > 1 0)
   b. x <= 5 || y < 15
   c. (x != 5) && (y != z)
   d. x >= z || (x + y >= z)
   e. (x <= y − 2) && (y >= z) || (z − 2 != 20)

Activity-6

Suppose that x, y, z,and w are int variables and x = 3, y = 4, z = 7,and w =1. What is the output of the following statements?

   a. System.out.println("x == y: " + (x == y));
   b. System.out.println("x != z: " + (x != z));
   c. System.out.println("y == z − 3: " + (y == z − 3));
   d. System.out.println("!(z > w): " + ! (z > w));
   e. System.out.println("x + y < z: " + (x + y < z));

Activity-7

Consider the following code segment. Determine the value of **b3**

```
 boolean b1=true;
boolean b2=false;
boolean b3=(b1==b2);
```

One-Way If Statement; Two-Way If Statement; Nested If Statement; Multi-way If Statement; Conditional Operators; Switch Statement

Activity-8
Minimum of two numbers: Given two integers, print the smaller value.

Activity-9
Sign function: For the given integer X print 1 if it's positive, -1 if it's negative, or 0 if it's equal to zero.

Activity-10
Minimum of three numbers: Given three integers, print the smallest value.

Activity-11
Equal numbers: Given three integers, determine how many of them are equal to each other. The program must print one of these numbers: 3 (if all are the same), 2 (if two of them are equal to each other and the third is different) or 0 (if all numbers are different).

Sample Input: 10 5 10   Output: 2

Activity-12
Roman Numerals
Write a program that prompts the user to enter a number within the range of 1 through 10. The program should display the Roman numeral version of that number. If the number is outside the range of 1 through 10, the program should display an error message. The following table shows the Roman numerals for the numbers 1 through 10:

Activity-13
Areas of Rectangles
The area of a rectangle is the rectangle's length times its width. Write a program that asks for the length and width of two rectangles. The program should tell the user which rectangle has the greater area, or if the areas are the same.

Activity-14
Mass and Weight
Scientists measure an object's mass in kilograms and its weight in newtons. If you know the amount of mass of an object in kilograms, you can calculate its weight in newtons with the following formula:

weight = mass x 9.8

Write a program that asks the user to enter an object's mass, and then calculates its

weight. If the object weighs more than 1,000 newtons, display a message indicating that it is too heavy. If the object weighs less than 10 newtons, display a message indicating that it is too light.

Activity-15
Magic Dates
The date June 10, 1960, is special because when it is written in the following format, the month times the day equals the year: **6/10/60**
Design a program that asks the user to enter a month (in numeric form), a day, and a two-digit year. The program should then determine whether the month times the day equals the year. If so, it should display a message saying the date is magic. Otherwise, it should display a message saying the date is not magic.

Activity-16
Color Mixer
The colors red, blue, and yellow are known as the primary colors because they cannot be made by mixing other colors. When you mix two primary colors, you get a secondary color, as shown here:
When you mix red and blue, you get purple.
When you mix red and yellow, you get orange.
When you mix blue and yellow, you get green.
Design a program that prompts the user to enter the names of two primary colors to mix. If the user enters anything other than "red," "blue," or "yellow," the program should display an error message. Otherwise, the program should display the name of the secondary color that results.

Activity-17
Change for a Dollar Game
Create a change-counting game that gets the user to enter the number of coins required to make exactly one dollar. The program should prompt the user to enter the number of pennies, nickels, dimes, and quarters. If the total value of the coins entered is equal to one dollar, the program should congratulate the user for winning the game. Otherwise, the program should display a message indicating whether the amount entered was more than or less than one dollar

Activity-18
Book Club Points
Serendipity Booksellers has a book club that awards points to its customers based on the number of books purchased each month. The points are awarded as follows:

• If a customer purchases 0 books, he or she earns 0 points.

• If a customer purchases 1 book, he or she earns 5 points.

• If a customer purchases 2 books, he or she earns 15 points.

• If a customer purchases 3 books, he or she earns 30 points.

• If a customer purchases 4 or more books, he or she earns 60 points.

Write a program that asks the user to enter the number of books that he or she has purchased this month and displays the number of points awarded.

Activity-19
Software Sales

A software company sells a package that retails for $99. Quantity discounts are given according to the following table:

Quantity	Discount
10–19	20%
20–49	30%
50–99	40%
100 or more	50%

Write a program that asks the user to enter the number of packages purchased. The program should then display the amount of the discount (if any) and the total amount of the purchase after the discount.

Activity-20
Shipping Charges

The Fast Freight Shipping Company charges the following rates:

Weight of Package	Rate per Pound
2 pounds or less	$1.10
Over 2 pounds but not more than 6 pounds	$2.20
Over 6 pounds but not more than 10 pounds	$3.70
Over 10 pounds	$3.80

Write a program that asks the user to enter the weight of a package and then displays the shipping charges.

Activity-21
Body Mass Index Program Enhancement
The BMI is often used to determine whether a person is overweight or underweight for their height. A person's BMI is calculated with the formula

$$BMI = weight \times 703 / height^2$$

Where weight is measured in pounds and height is measured in inches. Write a program that displays a message indicating whether the person has optimal weight, is underweight, or is overweight. A person's weight is considered to be optimal if his or her BMI is between 18.5 and 25. If the BMI is less than 18.5, the person is considered to be underweight. If the BMI value is greater than 25, the person is considered to be overweight.

Activity-22
Time Calculator
Write a program that asks the user to enter a number of seconds, and works as follows:
- There are 60 seconds in a minute. If the number of seconds entered by the user is greater than or equal to 60, the program should display the number of minutes in that many seconds.
- There are 3,600 seconds in an hour. If the number of seconds entered by the user is greater than or equal to 3,600, the program should display the number of hours in that many seconds.

There are 86,400 seconds in a day. If the number of seconds entered by the user is greater than or equal to 86,400, the program should display the number of days in that many seconds.