Institute of Computer Technology

B. Tech. Computer Science and Engineering

Semester: III

Sub: Object-Oriented Programming

Course Code: 2CSE303

Practical Number:1

Objective:

To learn about sample Java program by using class, method, variable, data type, System.out.println (), Scanner class, and format specification.

Q.1.Problem Definition:

Ajay and Vijay are two students studying Java programming. They have been given a task by their instructor to swap the values of two variables. They have to demonstrate two methods: one using a third variable, and the other without using a third variable.

- Method using a third variable:

  Ajay decides to implement the method using a third variable. He has two integer variables, x and y, with initial values x = 20 and y = 40. So, an appropriate Java program to help Ajay swap the values of x and y using a third variable, and then display the new values accordingly.

Code :

```java
public class SwapUsingThirdVariable {
    public static void main(String[] args) {
        int x = 20;
        int y = 40;
        int temp;

        // Display initial values
        System.out.println("Before swapping: x = " + x + ", y = " +
            y);

        // Swap using a third variable
        temp = x;
        x = y;
        y = temp;

        // Display swapped values
        System.out.println("After swapping: x = " + x + ", y = " + y
            );
    }
}
```

Output :

```
Before swapping: x = 20, y = 40
After swapping: x = 40, y = 20
```

- Method without using a third variable:

  Vijay prefers an approach that doesn't use an additional variable to swap his values. he also has two integer variables, a and b, with initial values a = 10 and b = 20. So, write an appropriate Java program to assist Vijay in swapping the values of a and b without using a third variable, and then display the updated values.

Code :

```java
public class SwapValues {
    public static void main(String[] args) {
        int a = 10;
        int b = 20;

        System.out.println("Before swapping:");
        System.out.println("a = " + a);
        System.out.println("b = " + b);

        // Swapping without using a third variable
        a = a + b; // a now becomes 30
        b = a - b; // b now becomes 10
        a = a - b; // a now becomes 20

        System.out.println("After swapping:");
        System.out.println("a = " + a);
        System.out.println("b = " + b);
    }
}
```

Output :

```
Before swapping:
a = 10
b = 20
After swapping:
a = 20
b = 10
```

Q.2. Write an appropriate program to find the following without the use of loop and condition.

1.) Find addition, subtraction, Multiplication, and division of given two number that is 100 and 25.

Code :

```java
public class ArithmeticOperations {
    public static void main(String[] args) {
        int num1 = 100;
        int num2 = 25;

        // Addition
        int sum = num1 + num2;

        // Subtraction
        int difference = num1 - num2;

        // Multiplication
        int product = num1 * num2;

        // Division
        int quotient = num1 / num2;

        // Display the results
        System.out.println("Addition of " + num1 + " and " + num2 + " is: " + sum);
        System.out.println("Subtraction of " + num1 + " and " + num2 + " is: " +
            difference);
        System.out.println("Multiplication of " + num1 + " and " + num2 + " is: " +
            product);
        System.out.println("Division of " + num1 + " by " + num2 + " is: " + quotient);
    }
}
```

Output :

```
Addition of 100 and 25 is: 125
Subtraction of 100 and 25 is: 75
Multiplication of 100 and 25 is: 2500
Division of 100 by 25 is: 4
```

2.) Find addition of each digit number. [Note: One number given, that is :12345
Output should be: Addition of each digit is :15

Code :

```java
public class DigitSum {
    public static void main(String[] args) {
        int number = 12345;
        int digit1 = number / 10000;
        int digit2 = (number / 1000) % 10;
        int digit3 = (number / 100) % 10;
        int digit4 = (number / 10) % 10;
        int digit5 = number % 10;

        int sum = digit1 + digit2 + digit3 + digit4 + digit5;
        System.out.println("Addition of each digit is: " + sum);
    }
}
```

Output :

```
Addition of each digit is: 15
```

3.) Find alternate digit multiplication of given one five-digit number, that is 23456. Expected output should be:720

Code :

```java
import java.util.Scanner;

class Student2 {
    public static void main(String[] args) {
        int num, rem, product = 1;
        Scanner sc = new Scanner(System.in);

        // Take user input
        System.out.print("Enter a number: ");
        num = sc.nextInt();

        // Calculate product of digits
        rem = num % 10;
        product = product * rem;
        num = num / 10;

        rem = num % 10;
        product = product * rem;
        num = num / 10;

        rem = num % 10;
        product = product * rem;
        num = num / 10;

        rem = num % 10;
        product = product * rem;
        num = num / 10;

        rem = num % 10;
        product = product * rem;
        num = num / 10;

        System.out.println("The product of the digits is: " + product);
    }
}
```

Output :

```
Enter a number: 23456
The product of the digits is: 720
```

Q.3. Charlie and James are siblings who have recently received some money as a gift from their grandparents. Charlie decides to invest his money in a fixed deposit with a simple interest rate, while James chooses to invest her money in a savings account with a compound interest rate. They want to compare the growth of their investments after a certain period.

Q.3.1: Charlie invests $2000 in a fixed deposit account with a bank that offers a simple interest rate of 4% per annum. Calculate the total amount Charlie will have after 3 years. Assume that the interest is calculated annually.

Q.3.2: James invests $1500 in a savings account with a bank that offers a compound interest rate of 5% per annum. Calculate the total amount James will have after 4 years. Assume that the interest is compounded annually.

(The formulae to calculate Simple Interest and Compound Interest are as follows:

*Simple Interest (SI) = (Principal * Rate * Time) / 100*

*Compound Interest (CI) = Principal * (1 + Rate / 100)^Time – Principal)*

Code :

```
public class InvestmentComparison {
    public static void main(String[] args) {

        double charlieinvest = 2000;
        double charlieRate = 4;
        int charlieTime = 3;

        double jamesinvest = 1500;
        double jamesRate = 5;
        int jamesTime = 4;

        // Calculate and display results
        double charlieTotal = charlieinvest + (charlieinvest *
            charlieRate * charlieTime) / 100;
        double jamesTotal = jamesinvest * Math.pow((1 + jamesRate /
            100), jamesTime);

        System.out.println("Charlie's Total Amount after " +
            charlieTime + " years: $" + charlieTotal);
        System.out.println("James's Total Amount after " + jamesTime +
            " years: $" + jamesTotal);
    }
}
```

Output :

```
Charlie's Total Amount after 3 years: $2240.0
James's Total Amount after 4 years: $1823.2593
```