CENTRAL CALCUTTA POLYTECHNIC

21, Convent Road, Philips, Sealdah, Kolkata, West Bengal 700014

DEPT. : COMPUTER SCIENCE AND TECHNOLOGY

- NAME : SUMAN MONDAL
- ROLL : DCCPCSTS5
- NUMBER : 10005537
- REG NUMBER : D192005242
- SUBJECT : JAVA PROGRAMMING
- SESSION : 2021 - 2022
- EMAIL : SUMAN.MONDAL@OUTLOOK.IN

Contents

Chapter 1

Java Assignment

1.1 Print the average of three numbers entered by user by creating a class named 'Average' having a method to calculate and print the average

Source Code :

```
import java.io.*;

class Average {

  //for user input
  BufferedReader ad = new BufferedReader(new
   ↪  InputStreamReader(System.in));

  public void calAvg() {
    try {
      System.out.print("Enter 1st Integer Number: ");
      int a = Integer.parseInt(ad.readLine());
      System.out.print("Enter 2nd Integer Number: ");
      int b = Integer.parseInt(ad.readLine());
      System.out.print("Enter 3rd Integer Number: ");
      int c = Integer.parseInt(ad.readLine());
      int avg = (a + b + c) / 3;
      System.out.print("Average of Three Numbers: " + avg);
    } catch (Exception e) {
      System.err.println(e);
    }
  }
}

class Q01 {

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

```
    Average ob = new Average();
    ob.calAvg();
  }
}
```

Program Output :

```
ccpcst-assignment/java on  main [!?] took 6s
→ javac Q01.java

ccpcst-assignment/java on  main [!?]
→ java Q01
Enter 1st Integer Number: 12
Enter 2nd Integer Number: 14
Enter 3rd Integer Number: 36
Average of Three Numbers: 20%
```

1.2 Print the sum, differences and product of two complex numbers by creating a class named 'Complex' with separate methods for each operation whose real and imaginary part is to be entered by the user

Source Code :

```
import java.io.*;

class Complex {

  BufferedReader ad = new BufferedReader(new
   ↪  InputStreamReader(System.in));
  int r1, r2;
  int img1, img2;

  public void getData() {
    try {
      System.out.print("Enter Real Part of 1st Number: ");
      r1 = Integer.parseInt(ad.readLine());
      System.out.print("Enter Imaginary Part of 1st Number: ");
      img1 = Integer.parseInt(ad.readLine());
      System.out.print("Enter Real Part of 2nd Number: ");
      r2 = Integer.parseInt(ad.readLine());
      System.out.print("Enter Imaginary Part of 2nd Number: ");
      img2 = Integer.parseInt(ad.readLine());
    } catch (Exception e) {
```

```
      System.err.println(e);
    }
  }

  public void showData() {
    System.out.println("1st Number: " + r1 + "+" + img1 + "i");
    System.out.println("2nd Number: " + r2 + "+" + img2 + "i");
  }

  public void addition() {
    int sumReal = r1 + r2;
    int sumImg = img1 + img2;
    System.out.println("Addition is: " + sumReal + "+" + sumImg +
    ↪  "i");
  }

  public void subtraction() {
    int subReal = r1 - r2;
    int subImg = img1 - img2;
    System.out.println("Subtraction is: " + subReal + "+" + subImg +
    ↪  "i");
  }

  public void multi() {
    int mul1 = r1 * r2 + (img1 * img2 * (-1));
    int mul2 = r1 * img2 + r2 * img1;
    System.out.println("Product is: " + mul1 + "+" + mul2 + "i");
  }
}

class Q02 {

  public static void main(String[] args) {
    Complex ob = new Complex();
    ob.getData();
    ob.showData();
    ob.addition();
    ob.subtraction();
    ob.multi();
  }
}
```

Program Output :

```
ccpcst-assignment/java on  main [!?] took 8s
→ javac Q02.java

ccpcst-assignment/java on  main [!?]
→ java Q02
Enter Real Part of 1st Number: 1
Enter Imaginary Part of 1st Number: -2
Enter Real Part of 2nd Number: 5
Enter Imaginary Part of 2nd Number: -4
1st Number: 1+-2i
2nd Number: 5+-4i
Addition is: 6+-6i
Subtraction is: -4+2i
Product is: -3+-14i
```

1.3 Write a program that would print the information (name, year of joining, salary, address) of three employees by creating a class 'Employee'. The output should be in a tabular form

Source Code :

```java
class Employee {
    String name, address;
    int year, salary;
    public Employee(String n, int y, int sal, String add){
      name = n;
      year = y;
      salary = sal;
      address = add;
    }
    public String getName() {
      return name;
    }
    public int getYear() {
      return year;
    }
    public int getSalary() {
      return salary;
    }
    public String getAddress() {
      return address;
    }
  }

  class Q03 {
    public static void main(String[] args){
```

```
        Employee e1 = new Employee("Luffy", 2015, 25000, "24 Pirate
         ↪  Ship");
        Employee e2 = new Employee("Eren", 2000, 36000, "36
         ↪  Panchanantala");
        Employee e3 = new Employee("Rin", 1999, 90000, "65
         ↪  Neregachia");

        System.out.println("Name\tYear of joining\tSalary\tAddress");

         ↪  System.out.println(e1.getName()+"\t"+e1.getYear()+"\t\t"+e1.getSa

         ↪  System.out.println(e2.getName()+"\t"+e2.getYear()+"\t\t"+e2.getSa

         ↪  System.out.println(e3.getName()+"\t"+e3.getYear()+"\t\t"+e3.getSa
    }
}
```

Program Output :

```
ccpcst-assignment/java/codes on  main [!?]
→ javac Q03.java

ccpcst-assignment/java/codes on  main [!?] took
→ java Q03
Name    Year of joining Salary  Address
Luffy   2015            25000   24 Pirate Ship
Eren    2000            36000   36 Panchanantala
Rin     1999            90000   65 Neregachia
```

1.4 Write a program to input the details of a student using constructor and display the sam

Source Code :

```
class Stud {

  private String name, clg, dept;
  private int roll;

  Stud(String name, String clg, String dept, int roll) {
    this.name = name;
    this.clg = clg;
    this.dept = dept;
    this.roll = roll;
```

```java
  }

  public String getName() {
    return name;
  }

  public String getClg() {
    return clg;
  }

  public String getDept() {
    return dept;
  }

  public int getRoll() {
    return roll;
  }
}

class Q04 {

  public static void main(String[] args) {
    Stud ob = new Stud("Suman", "CCP", "CST", 10005537);
    System.out.println("Student Name: " + ob.getName());
    System.out.println("Student College: " + ob.getClg());
    System.out.println("Student Department: " + ob.getDept());
    System.out.println("Student Roll: " + ob.getRoll());
  }
}
```

Program Output :

```
ccpcst-assignment/java on  main [!?]
→ javac Q04.java

ccpcst-assignment/java on  main [!?] took 2s
→ java Q04
Student Name: Suman
Student College: CCP
Student Department: CST
Student Roll: 10005537
```

1.5 Write a program to print the information of three employees by creating a class 'Employee' and show the details of all three Employees using Abstract class

Source Code :

```
abstract class Employee {
    String ename;
    int eid, sal;
    Employee (String ename, int eid, int sal) {
        this.ename = ename;
        this.eid = eid;
        this.sal = sal;
    }
    String getName () { return ename; };
    int getEid () { return eid; };
    int getSal () { return sal; };
}

class InfoEmp extends Employee {
    InfoEmp (String e, int i, int s) { super(e, i, s); };
}

class Q05 {
    public static void main (String[] args) {
        InfoEmp ob1 = new InfoEmp("Biden", 2021, 50000);
        InfoEmp ob2 = new InfoEmp("JP", 2022, 60000);
        InfoEmp ob3 = new InfoEmp("Kim", 2022, 25000);

        System.out.println("Name\tEmployee ID\tSalary");

        ↪ System.out.println(ob2.getName()+"\t"+ob2.getEid()+"\t\t"+ob2.g

        ↪ System.out.println(ob3.getName()+"\t"+ob3.getEid()+"\t\t"+ob3.g

        ↪ System.out.println(ob1.getName()+"\t"+ob1.getEid()+"\t\t"+ob1.g
    }
}
```

Program Output :

```
ccpcst-assignment/java on  main [!?]
→ javac Q05.java

ccpcst-assignment/java on  main [!?] took 4s
→ java Q05
Name    Employee ID     Salary
JP      2022            60000
Kim     2022            25000
Biden   2021            50000
```

1.6 Write a program to give the example for 'this' operator. And also use the 'this' keyword as a return statement

Source Code :

```
class Color {

  String r;
  String b;

  Color() {
    r = "red";
    b = "blue";
  }

  //return instance of Color
  Color getColor() {
    return this;
  }

  void showColor() {
    System.out.println("r = " + r + "\nb = " + b);
  }
}

class Q06 {

  public static void main(String[] args) {
    Color ob = new Color();
    ob.getColor().showColor();
  }
}
```

Program Output :

```
ccpcst-assignment/java on  main [!?]
→ javac Q06.java

ccpcst-assignment/java on  main [!?] took 5s
→ java Q06
r = red
b = blue
```

1.7 Write a program to add all the elements of a One-Dimensional array

Source Code :

```
class Q07 {

  public static void main(String[] args) {
    int arr[] = { 10, 31, 45, 5, 3, 11 };
    int sum = 0;

    System.out.print("Array is: ");
    for (int j = 0; j < arr.length; j++) {
      System.out.print(" " + arr[j]);
    }
    System.out.print("\n");
    for (int i = 0; i < arr.length; i++) {
      sum = sum + arr[i];
    }
    System.out.print("Sum of Arrya is: " + sum);
  }
}
```

Program Output :

```
ccpcst-assignment/java/codes on  main [!?]
→ javac Q07.java

ccpcst-assignment/java/codes on  main [!?]
→ java Q07
Array is:  10 31 45 5 3 11
Sum of Arrya is: 105%
```

1.8 Write a program to reverse the elements of a One-Dimensional array

Source Code :

```
class Q08 {

  public static void main(String[] args) {
    int j = 0;
    int arr[] = { 10, 31, 45, 5, 3, 11 };
    int revarr[] = new int[arr.length];

    System.out.print("Array is: ");
    for (int k = 0; k < arr.length; k++) {
      System.out.print(" " + arr[k]);
    }
    //copy reversed elements to another array
    for (int i = arr.length; i > 0; i--, j++) revarr[j] = arr[i -
     ↪  1];
    System.out.print("\n");

    System.out.print("Reverse Array is: ");
    for (int l = 0; l < arr.length; l++) {
      System.out.print(" " + revarr[l]);
    }
  }
}
```

Program Output :

```
ccpcst-assignment/java/codes on  main [!?]
→ javac Q08.java

ccpcst-assignment/java/codes on  main [!?]
→ java Q08
Array is:  10 31 45 5 3 11
Reverse Array is:  11 3 5 45 31 10%
```

1.9 Write a program to perform addition, subtraction, multiplication and division of two One-Dimensional arrays

Source Code :

```
class Q09 {
```

```java
public static void main(String[] args) {
  int arr1[] = { 100, 200, 300, 400, 500 };
  int arr2[] = { 10, 20, 30, 40, 50 };
  int p = arr1.length;

  System.out.print("1st array: ");
  for (int i = 0; i < p; i++) System.out.print(" " + arr1[i]);

  System.out.print("\n");
  System.out.print("2nd array: ");
  for (int j = 0; j < p; j++) System.out.print(" " + arr2[j]);

  System.out.print("\n");
  int sum[] = new int[p];
  int sub[] = new int[p];
  int mul[] = new int[p];
  int div[] = new int[p];

  for (int k = 0; k < p; k++) {
    sum[k] = arr1[k] + arr2[k];
    sub[k] = arr1[k] - arr2[k];
    mul[k] = arr1[k] * arr2[k];
    div[k] = arr1[k] / arr2[k];
  }
  System.out.print("\n");

  System.out.print("Addition of Arrays is: ");
  for (int i = 0; i < p; i++) System.out.print(" " + sum[i]);
  System.out.print("\n");

  System.out.print("Subtraction of Arrays is: ");
  for (int i = 0; i < p; i++) System.out.print(" " + sub[i]);
  System.out.print("\n");

  System.out.print("Multiplication of Arrays is: ");
  for (int i = 0; i < p; i++) System.out.print(" " + mul[i]);
  System.out.print("\n");

  System.out.print("Division of Arrays is: ");
  for (int i = 0; i < p; i++) System.out.print(" " + div[i]);
  System.out.print("\n");
}
```

```
}
```

Program Output :

```
ccpcst-assignment/java/codes on  main [!?]
→ javac Q09.java

ccpcst-assignment/java/codes on  main [!?]
→ java Q09
1st array:  100 200 300 400 500
2nd array:  10 20 30 40 50

Addition of Arrays is:  110 220 330 440 550
Subtraction of Arrays is:  90 180 270 360 450
Multiplication of Arrays is:  1000 4000 9000 16000 25000
Division of Arrays is:  10 10 10 10 10
```

1.10 Write a program to perform addition of two Two-Dimensional arrays

Source Code :

```
public class Q10 {

  public static void main(String[] args) {
    int r = 2;
    int c = 4;
    int[][] arr1 = { { 6, 2, 1, 0 }, { -4, 7, 5, 13 } };
    int[][] arr2 = { { 10, 20, -20, 5 }, { 6, 7, 1, 0 } };

    int[][] sum = new int[r][c];
    for (int i = 0; i < r; i++) {
      for (int j = 0; j < c; j++) {
        sum[i][j] = arr1[i][j] + arr2[i][j];
      }
    }

    System.out.println("Sum of two dimentional arrays is: ");
    for (int i = 0; i < r; i++) {
      for (int j = 0; j < c; j++) {
        System.out.print(sum[i][j] + "    ");
      }
      System.out.println();
    }
  }
}
```

Program Output :

```
ccpcst-assignment/java/codes on  main [!?]
→ javac Q10.java

ccpcst-assignment/java/codes on  main [!?]
→ java Q10
Sum of two dimentional arrays is:
16    22    -19    5
2    14    6    13
```

1.11 Write a program to take a string as input and display the string and its length. (Using string Functions)

Source Code :

```
import java.io.*;

class Q11 {
    public static void main(String[] args) {
    BufferedReader ad = new BufferedReader(new
     ↪  InputStreamReader(System.in));

    try {
      System.out.print("Enter any String: ");
      String str = ad.readLine();
      System.out.print(
        "You Entered: " +
        str +
        "\n" +
        "Length of the String is: " +
        str.length()
      );
    } catch (Exception e) {
      System.err.print(e);
    }
  }
}
```

Program Output :

```
ccpcst-assignment/java/codes on  main [!?]
→ javac Q11.java

ccpcst-assignment/java/codes on  main [!?] took 2s
→ java Q11
Enter any String: Hey how's going
You Entered: Hey how's going
Length of the String is: 15%
```

1.12 Write a program to check whether the inputted string is a Palindrome string or not

Source Code :

```java
import java.io.*;

class Q12 {

  static boolean isPalindrome(String str) {
    int i = 0;
    int j = str.length() - 1;

    while (i < j) {
      if (str.charAt(i) != str.charAt(j)) return false;
      i++;
      j--;
    }
    return true;
  }

  public static void main(String[] args) {
    BufferedReader ad = new BufferedReader(new
     ↪  InputStreamReader(System.in));
    try {
      System.out.println("Enter a String: ");
      String str = ad.readLine();

      str = str.toLowerCase();

      if (isPalindrome(str)) System.out.print(
        "Palindrom: Yes"
      ); else System.out.print("Palindrom: No");
```

```
    } catch (Exception e) {
      System.err.print(e);
    }
  }
}
```

Program Output :

```
ccpcst-assignment/java/codes on  main [!?] took 10s
→ javac Q12.java

ccpcst-assignment/java/codes on  main [!?]
→ java Q12
Enter a String:
moonlight
Palindrom: No%
```

1.13 Java Program to count Total number of characters in a string

Source Code :

```
import java.io.*;

class Q13 {

  public static void main(String[] args) {
    BufferedReader ad = new BufferedReader(new
     ↪  InputStreamReader(System.in));
    try {
      String str;
      System.out.println("Enter the string : ");
      str = ad.readLine();
      int len = 0;
      for (int i = 0; i < str.length(); i++) {
        if (str.charAt(i) != ' ') len++;
      }
      System.out.println("Total Number of Character : " + len);
    } catch (Exception e) {
      System.out.print(e);
    }
  }
}
```

Program Output :

```
ccpcst-assignment/java/codes on  main [!?] took 5s
→ javac Q13.java

ccpcst-assignment/java/codes on  main [!?]
→ java Q13
Enter the string :
Naruto Uzumaki
Total Number of Character : 13
```

1.14 Java Program to count the total number of vowels and consonants in a string

Source Code :

```
import java.io.*;

class Q14 {

  public static void main(String args[]) {
    BufferedReader ad = new BufferedReader(new
     ↪  InputStreamReader(System.in));
    String str;
    int vow = 0;
    int cons = 0;
    try {
      System.out.println("Enter a string : ");

      str = ad.readLine();
      int len = str.length();

      for (int i = 0; i < len; i++) {
        if (
          str.charAt(i) == 'a' ||
          str.charAt(i) == 'e' ||
          str.charAt(i) == 'i' ||
          str.charAt(i) == 'o' ||
          str.charAt(i) == 'u'
        ) {
          vow++;
        } else {
          cons++;
        }
```

```
      }
      System.out.println("Vowels : " + vow);
      System.out.println("Consonants : " + cons);
    } catch (Exception e) {
      System.out.print(e);
    }
  }
}
```

Program Output :

```
ccpcst-assignment/java/codes on  main [!?]
→ javac Q14.java

ccpcst-assignment/java/codes on  main [!?]
→ java Q14
Enter a string :
Marin Kitagawa
Vowels : 6
Consonants : 8
```

1.15 Java Program to remove all the white spaces from a string

Source Code :

```
import java.io.*;

class Q15 {

  public static void main(String args[]) {
    String str, mystr;
    BufferedReader ad = new BufferedReader(new
     ↪  InputStreamReader(System.in));
    try {
      System.out.println("Enter a String : ");
      str = ad.readLine();
      mystr = str.replaceAll(" ", "");
      System.out.println("New String is: " + mystr);
    } catch (Exception e) {
      System.err.print(e);
    }
  }
}
```

Program Output :

```
ccpcst-assignment/java/codes on  main [!?]
➜ javac Q15.java

ccpcst-assignment/java/codes on  main [!?]
➜ java Q15
Enter a String :
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Proin id massa a e
x tempor pharetra id nec ante
New String is: Loremipsumdolorsitamet,consecteturadipiscingelit.Proinidmass
aaextemporpharetraidnecante
```

1.16 Java program to find the duplicate characters in a string

Source Code :

```
import java.io.*;

class Q16 {

  public static void main(String args[]) {
    String str;
    int len = 0;
    BufferedReader ad = new BufferedReader(new
     ↪  InputStreamReader(System.in));
    try {
      System.out.print("Enter a String: ");
      str = ad.readLine();

      char[] arr = str.toCharArray();
      System.out.println("Duplicate Characters are:");
      for (int i = 0; i < str.length(); i++) {
        for (int j = i + 1; j < str.length(); j++) {
          if (arr[i] == arr[j]) {
            System.out.print(arr[j] + " ");
            len++;
            break;
          }
        }
      }
    } catch (Exception e) {
      System.err.print(e);
    }
  }
}
```

Program Output :

```
ccpcst-assignment/java/codes on  main [!?] took 15s
→ javac Q16.java

ccpcst-assignment/java/codes on  main [!?] took 2s
→ java Q16
Enter a String: command
Duplicate Characters are:
m %
```

1.17 Java program to swap two string variables without using third or temp variable

Source Code :

```
import java.io.*;

class Q17 {

  public static void main(String args[]) {
    String str1, str2;
    BufferedReader ad = new BufferedReader(new
     ↪  InputStreamReader(System.in));
    try {
      System.out.println("Enter first string : ");
      str1 = ad.readLine();
      System.out.println("Enter second string : ");
      str2 = ad.readLine();
      str1 = str1 + str2;
      str2 = str1.substring(0, str1.length() - str2.length());
      str1 = str1.substring(str2.length());
      System.out.println("After Swap : " + str1 + " " + str2);
    } catch (Exception e) {
      System.err.print(e);
    }
  }
}
```

Program Output :

```
ccpcst-assignment/java/codes on ᚠ main [!?]
→ javac Q17.java

ccpcst-assignment/java/codes on ᚠ main [!?]
→ java Q17
Enter first string :
Mondal
Enter second string :
Suman
After Swap : Suman Mondal
```

1.18 Write a program that accepts a shopping list of five items from the command line and stores in a Vector

Source Code :

```
import java.util.*;

class Q18
{
    public static void main(String args[ ])
    {
        int j = 0, i;
        Vector vec = new Vector(5,2);

        j =args.length;
        for(i = 0;i < j; i++)
            vec.addElement(args[i]);

        Enumeration vecenum = vec.elements();

        System.out.println("\nItems in Shopping list are:");
        while(vecenum.hasMoreElements())
            System.out.println(vecenum.nextElement() +"   ");
        System.out.println();
    }
}
```

Program Output :

```
ccpcst-assignment/java/codes on ᚠ main [!?]
→ javac Q18.java
Note: Q18.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

ccpcst-assignment/java/codes on ᚠ main [!?]
→ java Q18 mango apple orange guava banana

Items in Shopping list are:
mango
apple
orange
guava
banana
```

1.19 Modify the program of Q.18 to accomplish the following: - To delete an item in the list - To add an item at a specified location in the list - To add an item at the end of the list - To print the contents of the vector

Source Code :

```
import java.util.*;

class Q19
{
    public static void main(String args[ ])
    {
        int j = 0, i;
        Vector vec = new Vector(5,2);

        j =args.length;
        for(i = 0;i < j; i++)
            vec.addElement(args[i]);

        Enumeration vecenum = vec.elements();
        vec.removeElementAt(3);
        vec.insertElementAt("Car", 3);
        vec.addElement("Bread");

        System.out.println("\nItems in Shopping list are:");
        while(vecenum.hasMoreElements())
            System.out.println(vecenum.nextElement() +"   ");
        System.out.println();
    }
}
```

Program Output :

```
ccpcst-assignment/java/codes on  main [!?]
→ javac Q19.java
Note: Q19.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

ccpcst-assignment/java/codes on  main [!?]
→ java Q19 mango apple orange guava banana

Items in Shopping list are:
mango
apple
orange
Car
banana
Bread
```