Internet Technologies

1. *Write a JSP program to display the following pattern:*

```
        1
      1 1
    1 2 1
  1 3 3 1
1 4 6 4 1
```

Answer:

```
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Insert title here</title>
</head>
<body>

	<%!
		public int fact(int n){		//method defination
			int f = 1;
			for(int i = 1; i<=n; i++){
				f = f*i;
			}
			return f;
		}
	%>

	<%
		for(int i=0; i<5; i++){
			for(int j=0; j<=5-i; j++){ %>
				 
			<%}%>
		 <% for(int j=0; j<=i; j++){ %>
				<%=fact(i)/(fact(i-j)*fact(j))%> 
			<%}%>
			<br>
	<%	}%>

</body>
</html>
```

2. *Make two files as follows: a. main.html: shows 2 text boxes and 3 radio buttons with values "addition", "subtraction" and "multiplication" b. operate.jsp: depending on what the user selects perform the corresponding function (Give two implementations: using request.getParameter() and using expression language)*

ANSWER:

STEP 1 : CREATE main.html

```
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>value page</title>
</head>
<body>

	<form action="operate.jsp" method="post">
		Enter 1st value : <input type="text" name="num1" value="eg. 5"><br><br>
		Enter 2nd value : <input type="text" name="num2" value="eg. 5"><br><br>
		<input type="radio" value="add" name="opr">Addition<br>
		<input type="radio" value="sub" name="opr">Subtraction<br>
		<input type="radio" value="mult" name="opr">Multiplication<br><br>
		<input type="submit" value="Perform">
	</form>

</body>
</html>
```

STEP 2 : CREATE operate.jsp

```
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Operation</title>
</head>
<body>

	<%
		Integer n1 = Integer.parseInt(request.getParameter("num1"));
		Integer n2 = Integer.parseInt(request.getParameter("num2"));
		String n3 = request.getParameter("opr");
		if(n3.equals("add")){
			out.println("Addition of " + n1 + " and " + n2 + " is : " + (n1+n2));
		}
		else if(n3.equals("sub")){
			out.println("Subtraction of " + n1 + " and " + n2 + " is : " + (n1-
n2));
		}
		else{
			out.println("Multiplication of " + n1 + " and " + n2 + " is : " +
(n1*n2));
		}
	%>

</body>
</html>
```

OUTPUT

3. *USING JSP PROGRAM VALIDATE USER INPUT ENTERED IN A FORM. THE INPUT MUST INCLUDE NAME, DOB, EMAIL ID, LUCKY NUMBER, FAVOURITE FOOD ETC.*

ANSWER:

CREATE FIRST PAGE

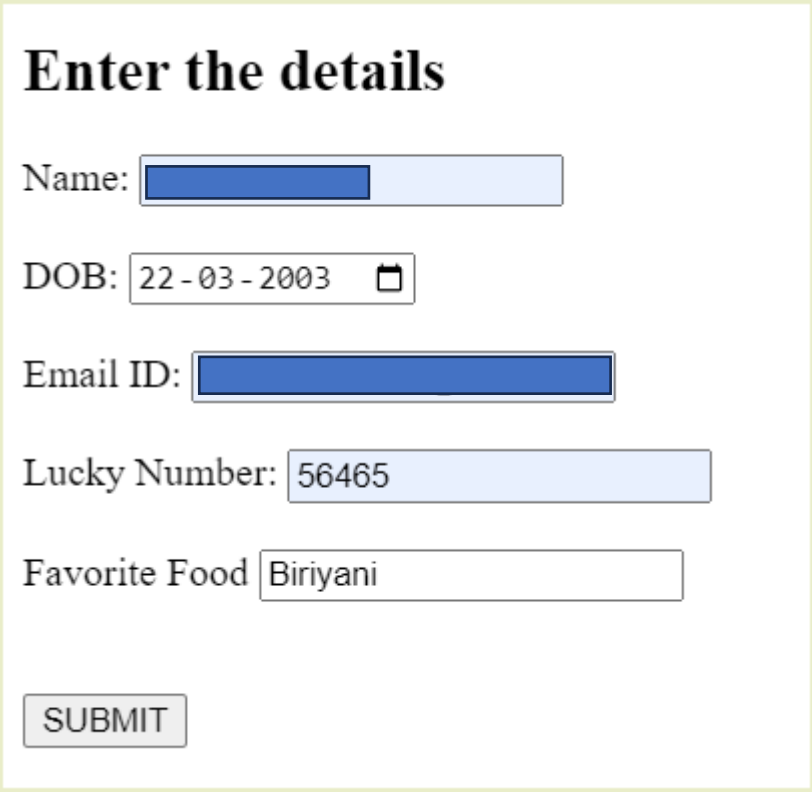
```
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Form Validation</title>
</head>
<body>
	<script type="text/javascript">
		return function data (){
			var Name = document.getElementById("Name").value;
			var DOB = document.getElementById("DOB").value;
			var EmailId = document.getElementById("EmailId").value;
			var LuckyNumber = document.getElementById("LuckyNumber").value;
			var FavoriteFood = document.getElementById("FavoriteFood").value;

			if (Name==""||DOB==""||EmailId==""||LuckyNumber==""||FavoriteFood==""){
				alert("All feilds are mandetory");
				return false;
			}
			else if (isNaN(LuckyNumber)){
				alert("Please enter a number");
				return false;
			}
			else {
				true;
			}
		}

	</script>

	<form onsubmit="return data()" action="PQ21-Q03-P2.jsp">
		<h2>Enter the details</h2>
		Name:           <input type="text" id="Name"><br><br>
		DOB:            <input type="date" id="DOB"><br><br>
		Email ID:       <input type="text" id="EmailId"><br><br>
		Lucky Number:   <input type="text" id="LuckyNumber"><br><br>
		Favorite Food   <input type="text" id="FavoriteFood"><br><br><br>
		<input type="submit" value="SUBMIT">
	</form>
```

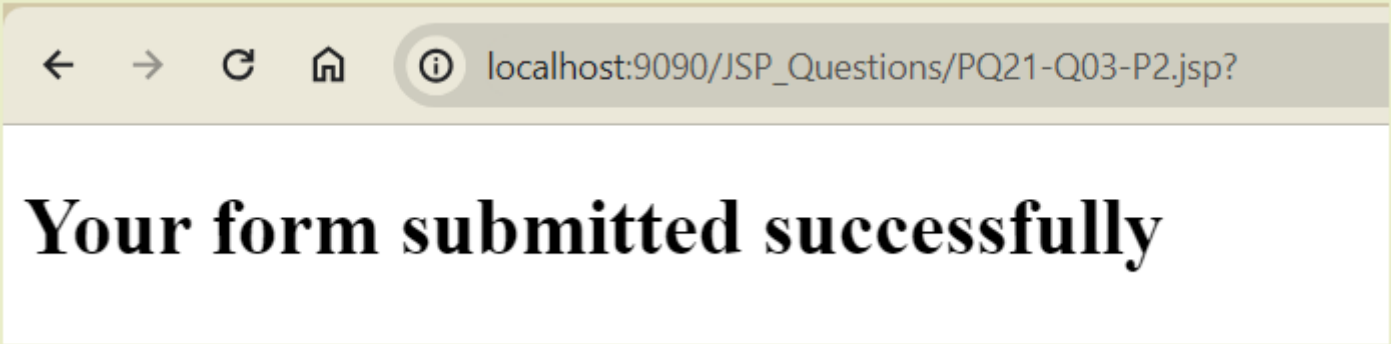
```
</body>
</html>
```

CREATE 2ND PAGE :

```
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Submit</title>
</head>
<body>
      <h1>Your form submitted successfully</h1>
</body>
</html>
```

OUTPUT:





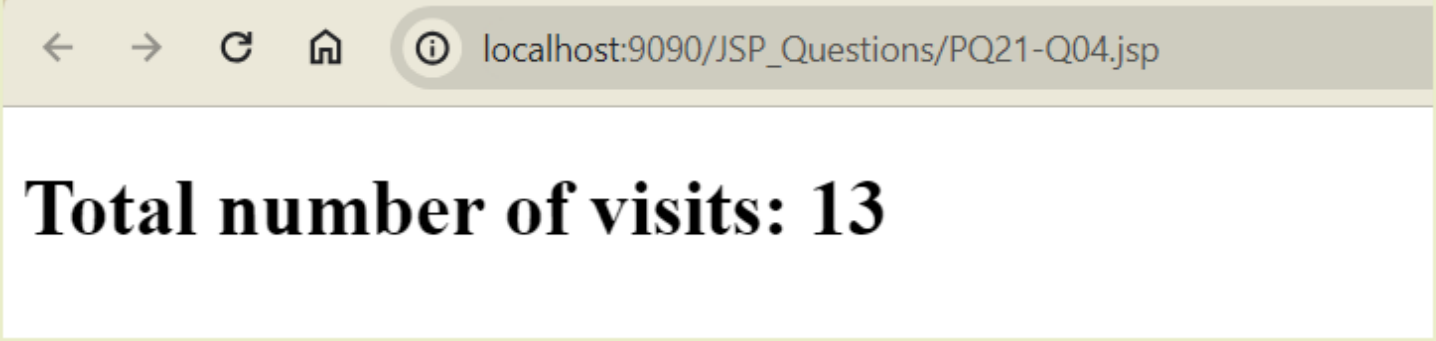
4. WRITE A JSP PROGRAM TO UPLOAD FILE INTO SERVER AND PRINT CURRENT DATE AND TIME.

5. WRITE A JSP PROGRAM TO COUNT NUMBER OF VISITORS ON WEBSITE.

ANSWER:

```
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>


<%@ page import = "java.io.*,java.util.*" %>
<!DOCTYPE html>
<html>
   <head>
      <title>Application object in JSP</title>
   </head>

   <body>
      <%
         Integer hitsCount = (Integer)application.getAttribute("hitCounter");
         if( hitsCount ==null || hitsCount == 0 ) {
            /* First visit */
            //out.println("Welcome to my website!");
            hitsCount = 1;
         } else {
            /* return visit */
            //out.println("Welcome back to my website!");
            hitsCount += 1;
         }
         application.setAttribute("hitCounter", hitsCount);
      %>

         <h1>Total number of visits: <%= hitsCount%></h1>

   </body>
</html>
```

OPTPUT



6. *Write a JSP Program to validate username and password to open an authentic session.*

Answer:

7. *Write a JSP program to display a given number in words.*

Answer:

```
//html code(index1.html)
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>File Upload</title>
</head>
<body>

		<form action="words.jsp" method="post">
				<h2>Enter a number : <input type="text" name="num"></h2>
				<input type="submit" value="Display">
		</form>

</body>
</html>


// Jsp code(words.jsp)

<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Number to Words</title>
</head>
<body>

		<%
				String s = request.getParameter("num");
				int l = s.length();
				int i = 0;
				while(i<l){
```

```
                                char ch = s.charAt(i);
                                switch(ch){
                                        case '1':
                                                out.print("One"); break;
                                        case '2':
                                                out.print("Two"); break;
                                        case '3':
                                                out.print("Three"); break;
                                        case '4':
                                                out.print("Four"); break;
                                        case '5':
                                                out.print("Five"); break;
                                        case '6':
                                                out.print("Six"); break;
                                        case '7':
                                                out.print("Seven"); break;
                                        case '8':
                                                out.print("Eight"); break;
                                        case '9':
                                                out.print("Nine"); break;
                                        default:
                                                out.print("Zero");
                                }
                                out.print(" ");
                                i++;
                        }
                %>

</body>
</html>
```

8. *Create a table 'Student' and 'Teacher' in 'College' database and insert two rows in this newly created table using JDBC API and do the following:*
    a. *Update an already created table 'Teacher' in 'College' database by updating a teachers' name with "Dr." appended before the name, whose name is "Rita".*
    b. *Repeat the same thing for all the teachers using PreparedStatement.*
    c. *Delete the student with ID=3 from 'Student' database.*
    d. *Insert two students to the Result Set returned by the query which selects all students with First Name="Ayush".*
    e. *The database must also get updated along with Result Set.*

Answer:

```
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.sql.ResultSet;
import java.sql.Statement;

public class Question_08
{
        public static void main(String args[]) {
                try {
                                DriverManager.registerDriver(new oracle.jdbc.driver.OracleDriver()); //driver register
                                Connection
connection=DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:XE","system","sasa");    //create
connection
                                Statement statement=connection.createStatement();
                                String studentQuery = "create table student(id number primary key, sname
varchar2(20), marks number)";
                                String teacherQuery = "create table teacher(tname varchar2(25), dept varchar2(20))";

                                statement.executeUpdate(studentQuery);
                                statement.executeUpdate(teacherQuery);

                                System.out.print("Inserting 2 student table values : ");
```

```
                                System.out.println(statement.executeUpdate("insert into student values(11,'sasanka
kundu',95)"));
                                System.out.println(statement.executeUpdate("insert into student values(3, 'ayush
sharma', 90)"));

                                System.out.print("Inserting 2 teacher table values : ");
                                System.out.println(statement.executeUpdate("insert into teacher
values('sam','physics')"));
                                System.out.println(statement.executeUpdate("insert into teacher values('rita',
'math')"));

                                statement.executeUpdate("update teacher set tname='Dr. rita' where tname='rita'");

                                String updateTeacher = "update teacher set tname=concat('Dr.', tname)";
                                PreparedStatement ps = connection.prepareStatement(updateTeacher);
                                ps.executeUpdate();

                                statement.executeUpdate("delete from student where id=3");

                                ResultSet rs = statement.executeQuery("select * from student where sname='ayush'");
                                rs.moveToInsertRow();
                                rs.updateInt("id", 3);
                                rs.updateString("sname", "ayush");
                                rs.updateInt("marks", 88);
                                rs.insertRow();
                                rs.moveToInsertRow();
                                rs.updateInt("id", 5);
                                rs.updateString("sname", "ayush");
                                rs.updateInt("marks", 50);
                                rs.insertRow();
                                /*while(rs.next()) {
                                        System.out.println(rs.getInt("id") + " " + rs.getString("sname") + " " +
rs.getString("marks"));
                                }*/
                        }
                        catch(Exception e) {
                                e.printStackTrace();
                        }
                }
}
```

9. *Create a procedure in MySQL to count the number of Rows in table 'Student'. Use Callable Statement to call this method from Java code.*

Answer:

```
import java.sql.CallableStatement;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.ResultSet;

public class Question_09
{
        public static void main(String args[]) {
                try
                {
                        //Class.forName("com.mysql.cj.jdbc.Driver");
                        //Connection connection =
DriverManager.getConnection("jdbc:mysql://localhost:3306/sasa", "root", "2002");

                        DriverManager.registerDriver(new oracle.jdbc.driver.OracleDriver()); //driver register
                        Connection
connection=DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:XE","system","sasa");
                        CallableStatement cst = connection.prepareCall("select count(*) from student");
                        ResultSet rs = cst.executeQuery();
                        while(rs.next()) {
                                System.out.print("number of rows : " + rs.getInt(1));
                        }
                }
                catch(Exception e) {
```

```
                e.printStackTrace();
            }
        }
}
```

10. Write a program using JDBC API to create a table 'Student' in the data base. Insert 5 records in the table 'Student'. Display all the records.

Answer:

```
import java.io.IOException;
import java.sql.*;

public class PQ21_Q10 {
    public static void main(String[] args) throws IOException {
        try {
            // Register Oracle JDBC driver
            DriverManager.registerDriver((Driver)new oracle.jdbc.driver.OracleDriver());
            System.out.println("Connecting to the database ... ");

            // Establish connection to the Oracle database
            Connection connection =
DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:XE", "system",
                    "1,j/");
            Statement statement = connection.createStatement();
            System.out.println("Connected successfully.");

            // Create 'Student' table if not exists
            statement.executeUpdate("CREATE TABLE sst (id INT, name VARCHAR(50))");
            System.out.println("Table 'sst' created successfully.");

            // Insert 5 records into the 'Student' table
            statement.executeUpdate("INSERT INTO sst VALUES (1, 'John')");
            statement.executeUpdate("INSERT INTO sst VALUES (2, 'Alice')");
            statement.executeUpdate("INSERT INTO sst VALUES (3, 'Bob')");
            statement.executeUpdate("INSERT INTO sst VALUES (4, 'Emma')");
            statement.executeUpdate("INSERT INTO sst VALUES (5, 'Michael')");
            System.out.println("Records inserted into 'sst' table.");

            // Display all records from the 'Student' table
            ResultSet resultSet = statement.executeQuery("SELECT * FROM sst");
            System.out.println("Student Records:");
            while (resultSet.next()) {
                int id = resultSet.getInt("id");
                String name = resultSet.getString("name");
                System.out.println("ID: " + id + ", Name: " + name);
            }

            // Close the resources
            resultSet.close();
            statement.close();
            connection.close();
```

```
        } catch (SQLException ex) {
            System.out.println("The Exception is : " + ex);
        }
    }
}
```

11. *Write a program using JDBC API to delete some records form 'Student' table created previously in the database system.*

Answer:

```
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.Statement;

public class Question_11
{
          public static void main(String args[]) {
                    try {
                              DriverManager.registerDriver(new oracle.jdbc.driver.OracleDriver()); //driver register
                              Connection
connection=DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:XE","system","sasa");    //create
connection
                              Statement statement=connection.createStatement();//statement
                              String query = "delete from student10 where sid between 10 and 15";
                              int del = statement.executeUpdate(query);
                              System.out.print(del + " row(s) deleted.");
                    }
                    catch(Exception e) {
                              System.out.print(e);
                    }
          }
}
```

12. *Write a java script*
    a. *To change the color of text using Set Time Out()*
    b. *To move an image across screen using Set Interval()*

Answer:

```
<html>

<head>
  <script>
    function changeColor() {
      var text = document.getElementById("text")
      var colors = ['red', 'green', 'blue', 'yellow']
      var colIndex = 0
      setInterval(function () {
        text.style.color = colors[colIndex++ % colors.length]
      }, 1000)
    }
    function moveImage() {
      var image = document.getElementById("image")
      var x = 0
      var dir = 1
      setInterval(function () {
        x += dir
        if (x >= window.innerWidth - image.width || x <= 0) {
          dir *= -1
        }
        image.style.left = x + "px"
      }, 10)
```

```
    }
  </script>
</head>

<body onload="changeColor(); moveImage();">
  <p id="text">Hello World</p>
  <img id="image" src="https://www.pixelstalk.net/wp-content/uploads/2016/07/Wallpapers-pexels-photo.jpg"
    style="position:absolute; height:100px; width:100px;">
</body>

</html>
```

13. *Write a java script to implement static password protection.*

Answer:

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Password Protection</title>
<script>
    // Define the static password
    const staticPassword = "password123";

    // Function to validate password
    function validatePassword() {
        // Get the password entered by the user
        const enteredPassword = document.getElementById("password").value;

        // Check if the entered password matches the static password
        if (enteredPassword === staticPassword) {
            alert("Correct password! You may proceed.");
            // Redirect to a protected page or perform desired action
            // window.location.href = "protected-page.html";
        } else {
            alert("Incorrect password! Please try again.");
            // Clear the password field for re-entry
            document.getElementById("password").value = "";
        }
    }
</script>
</head>
<body>
    <h2>Password Protection</h2>
    <p>Please enter the password to proceed:</p>
    <input type="password" id="password">
    <button onclick="validatePassword()">Submit</button>
</body>
</html>
```

14. *Create a student registration form. Create functions using java script to perform the following checks: a. Rollnumber is a 7-digit numeric value b. Name should be an alphabetical value (String) c. Non-emptyfields like DOB.*

Answer:

Step 1 : Create index.html

// REGISTRATION HTML

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>StudentInfo.com</title>
</head>
<body>
    <h1 style="text-align: center;">Registration Form</h1>
    <form name="RegForm" onsubmit="return Check()" method="post">
    <p>Your Name : <input type="text" size="80" name="Name"></p><br>
    <p>DOB : <input type="date" id="date" name="birth"></p>
    <p>Registration No : <input type="number" size="80" name="Reg"></p><br>
    <p>Roll : <input type="number" size="80" name="Roll"> Number : <input type="number" size="80"
name="Number"></p><br>
    <p>Email-Address : <input type="text" size="80" name="Email"></p><br>
    <p>Phone No : <input type="number" size="80" name="Phone"></p><br>
    <p>
        Select Your Honours Course :
        <select type="text" value="" name="Course">
            <option>Computer Science</option>
            <option>Mathematics</option>
            <option>Statistics</option>
            <option>Physics</option>
            <option>Chemistry</option>
            <option>Biotechnology</option>
            <option>Geography</option>
            <option>Sociology</option>
            <option>Microbiology</option>
        </select>
    </p><br>
    <p>
        Select Semester :
        <select type="text" value="" name="Sem">
            <option>5th Semester</option>
            <option>3rd Semester</option>
            <option>1st Semester</option>
        </select>
    </p><br>
    <p><button id="press">Check</button></p>
    <script src="validate.js"></script>
    </form>
</body>
</html>
```

Step 2: Create registration.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>StudentInfo.com</title>
</head>
<body>
    <h1 style="text-align: center;">Registration Form</h1>
    <form name="RegForm" onsubmit="return Check()" method="post">
    <p>Your Name : <input type="text" size="80" name="Name"></p><br>
    <p>DOB : <input type="date" id="date" name="birth"></p>
    <p>Registration No : <input type="number" size="80" name="Reg"></p><br>
    <p>Roll : <input type="number" size="80" name="Roll"> Number : <input type="number" size="80"
name="Number"></p><br>
    <p>Email-Address : <input type="text" size="80" name="Email"></p><br>
    <p>Phone No : <input type="number" size="80" name="Phone"></p><br>
    <p>
        Select Your Honours Course :
        <select type="text" value="" name="Course">
            <option>Computer Science</option>
            <option>Mathematics</option>
            <option>Statistics</option>
```

```
            <option>Physics</option>
            <option>Chemistry</option>
            <option>Biotechnology</option>
            <option>Geography</option>
            <option>Sociology</option>
            <option>Microbiology</option>
        </select>
    </p><br>
    <p>
        Select Semester :
        <select type="text" value="" name="Sem">
            <option>5th Semester</option>
            <option>3rd Semester</option>
            <option>1st Semester</option>
        </select>
    </p><br>
    <p><button id="press">Check</button></p>
    <script src="validate.js"></script>
    </form>
</body>
</html>
```

Step 3: Create validate.js

```
const btn = document.getElementById("press");

btn.addEventListener('click', function handleClick() {
    var name =
        document.forms.RegForm.Name.value;
    var dateInput =
        document.getElementById('date');
    var email =
        document.forms.RegForm.Email.value;
    var phone =
        document.forms.RegForm.Phone.value;
    var hons =
        document.forms.RegForm.Course.value;
    var reg =
        document.forms.RegForm.Reg.value;
    var roll =
        document.forms.Regform.Roll.value;
    var no =
        document.forms.RegForm.Number.value;
    var regEmail=/^\w+([\.-]?\w+)*@\w+([\.-]?\w+)*(\.\w{2,3})+$/g; //Javascript reGex for Email Validation.
    var regPhone=/^\d{10}$/;                                                                                    //
Javascript reGex for Phone Number validation.
    var regName = /\d+$/g;
    var regReg = /^\d{6}$/;
    var regRoll = /^\d{7}$/;
    var regNum = /^\d{7}$/;                                                 // Javascript reGex for Name
validation

    if (name == "" || regName.test(name)) {
        window.alert("Please enter your name properly.");
        name.focus();
        return false;
    }

    if(!dateInput.value){
        alert("DOB is empty.");
    }

    if (email == "" || !regEmail.test(email)) {
        window.alert("Please enter a valid e-mail address.");
        email.focus();
        return false;
    }

    if (phone == "" || !regPhone.test(phone)) {
        alert("Please enter valid phone number.");
        phone.focus();
        return false;
    }

    if (hons.selectedIndex == -1) {
```

```
        alert("Please enter your course.");
        hons.focus();
        return false;
    }

    if (reg == "" || !regReg.test(reg)) {
        alert("Please enter valid registration number.");
        reg.focus();
        return false;
    }

    if (roll == "" || !regRoll.test(roll)) {
        alert("Please enter valid roll");
        roll.focus();
        return false;
    }

    if (no == "" || !regNum.test(no)) {
        alert("Please enter valid Number.");
        no.focus();
        return false;
    }
    return true;
});
```

15. Create a java script to remove all whitespaces from a text inputted from a form.

Answer:

16. Create a java script to get the dimensions of an image.

Answer:

```
<head>
  <title>Dimention</title>
  <script>
    function getDm() {
      var img = document.getElementById('image')
      img.onload = function () {
        var height = img.height;
        var width = img.width;
        document.write('height : ', height);
        document.write('width : ', width)
      }
      img.onload()
    }
  </script>
</head>

<body onload="getDm()">

  <img id="image" src="https://www.pixelstalk.net/wp-content/uploads/2016/07/Wallpapers-pexels-photo.jpg"
    style="position:absolute; height:100px; width:100px;">
</body>

</html>
```

17. *Write a program to create an array of 10 integers. Accept values from the user in that array. Input another number from the user and find out how many numbers are equal to the number passed, howmany are greater and how many are less than the number passed.*

Answer:

```
import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;

public class Question_17
{
	public static void main(String args[]) throws IOException
	{
		BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
		int arr[] = new int[10];
		System.out.println("enter 10 values:");
		for(int i = 0; i<arr.length; i++) {
			System.out.print("enter value " + i + ":");
			arr[i] = Integer.parseInt(br.readLine());
		}
		System.out.print("enter a new value : ");
		int val = Integer.parseInt(br.readLine());
		int equal = 0, greater = 0, smaller = 0;
		for(int i : arr) {
			if(val==i)
				equal++;
			else if(val>i)
				smaller++;
			else
				greater++;
		}
		System.out.println("Equal numbers : " + equal);
		System.out.println("greater numbers : " + greater);
		System.out.println("smaller numbers : " + smaller);
	}
}
```

18. *Write java program for the following matrix operations: (a) Addition of two matrices (b)Summation of two matrices (c) Transpose of a matrix Input the elements of matrices from user*

Answer:

```
import java.io.BufferedReader;
import java.io.InputStreamReader;

public class Question_18
{
	public static void main(String args[]) throws Exception
	{
		BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
		int arr1[][], arr2[][];
		System.out.print("enter row & col number : ");
		int r = Integer.parseInt(br.readLine());
		int c = Integer.parseInt(br.readLine());
		System.out.println("enter values of 1st matrix : ");
		arr1 = new int[r][c];
		arr2 = new int[r][c];
		for(int i = 0; i<r; i++) {
			for(int j = 0; j<c; j++) {
				arr1[i][j] = Integer.parseInt(br.readLine());
			}
		}
		System.out.println("enter values for 2nd matrix : ");
		for(int i = 0; i<r; i++) {
			for(int j = 0; j<c; j++) {
				arr2[i][j] = Integer.parseInt(br.readLine());
			}
```

```
                }
                System.out.println("1st matrix : ");
                for(int i[] : arr1) {
                        for(int j : i) {
                                System.out.print(j + " ");
                        }
                        System.out.println();
                }
                System.out.println("2nd matrix : ");
                for(int i[] : arr2) {
                        for(int j : i) {
                                System.out.print(j + " ");
                        }
                        System.out.println();
                }

                int addArr[][] = new int[r][c];
                for(int i = 0; i<r; i++) {
                        for(int j = 0; j<c; j++) {
                                addArr[i][j] = arr1[i][j] + arr2[i][j];
                        }
                }
                System.out.println("addition of two matrices : ");
                for(int i[] : addArr) {
                        for(int j : i) {
                                System.out.print(j + " ");
                        }
                        System.out.println();
                }

                int s = 0;
                for(int i[] : arr1) {
                        for(int j : i) {
                                s = s + j;
                        }
                }
                System.out.print("Summation of two matrix : " + s);

                System.out.println("transpose of 1st matrix : ");
                for(int i = 0; i<r; i++) {
                        for(int j = 0; j<c; j++) {
                                System.out.print(arr1[j][i] + " ");
                        }
                        System.out.println();
                }
        }
}
```

19. *Write a java program that computes the area of a circle, rectangle and a Cylinder using function overloading.*

Answer:

```
import java.util.Scanner;

public class PQ21_Q19 {
    // Compute the area of a circle
    public static double calculateArea(double radius) {
        return Math.PI * radius * radius;
    }

    // Compute the area of a rectangle
    public static double calculateArea(double length, double width) {
        return length * width;
    }

    // Compute the lateral surface area of a cylinder
    public static double calculateArea(double radius, double height, boolean isCylinder)
{
        if (isCylinder) {
```

```
            return 2 * Math.PI * radius * height;
        } else {
            // If not a cylinder, return -1 to indicate invalid input
            return -1;
        }
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        // Input for the circle
        System.out.print("Enter the radius of the circle: ");
        double circleRadius = scanner.nextDouble();

        // Input for the rectangle
        System.out.print("Enter the length of the rectangle: ");
        double rectangleLength = scanner.nextDouble();
        System.out.print("Enter the width of the rectangle: ");
        double rectangleWidth = scanner.nextDouble();

        // Input for the cylinder
        System.out.print("Enter the radius of the cylinder: ");
        double cylinderRadius = scanner.nextDouble();
        System.out.print("Enter the height of the cylinder: ");
        double cylinderHeight = scanner.nextDouble();

        scanner.close();

        // Calculate area of a circle with given radius
        double circleArea = calculateArea(circleRadius);
        System.out.println("Area of the circle: " + circleArea);

        // Calculate area of a rectangle with given length and width
        double rectangleArea = calculateArea(rectangleLength, rectangleWidth);
        System.out.println("Area of the rectangle: " + rectangleArea);

        // Calculate lateral surface area of a cylinder with given radius and height
        double cylinderLateralArea = calculateArea(cylinderRadius, cylinderHeight, true);
        if (cylinderLateralArea != -1) {
            System.out.println("Lateral surface area of the cylinder: " +
cylinderLateralArea);
        } else {
            System.out.println("Invalid input for cylinder");
        }
    }
}
```

20. Write a java program to input 10 integers into an array and find the second minimum and second maximum number.

Answer:

```
import java.util.Scanner;

public class PQ21_Q20 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        // Input 10 integers into an array
        int[] numbers = new int[10];
        System.out.println("Enter 10 integers:");
        for (int i = 0; i < 10; i++) {
            numbers[i] = scanner.nextInt();
        }

        // Find the second minimum and second maximum number
        int secondMin = findSecondMin(numbers);
```

```
        int secondMax = findSecondMax(numbers);

        // Display the results
        System.out.println("Second minimum number: " + secondMin);
        System.out.println("Second maximum number: " + secondMax);

        scanner.close();
    }

    public static int findSecondMin(int[] arr) {
        int min = Integer.MAX_VALUE;
        int secondMin = Integer.MAX_VALUE;

        for (int num : arr) {
            if (num < min) {
                secondMin = min;
                min = num;
            } else if (num < secondMin && num != min) {
                secondMin = num;
            }
        }
        return secondMin;
    }

    public static int findSecondMax(int[] arr) {
        int max = Integer.MIN_VALUE;
        int secondMax = Integer.MIN_VALUE;

        for (int num : arr) {
            if (num > max) {
                secondMax = max;
                max = num;
            } else if (num > secondMax && num != max) {
                secondMax = num;
            }
        }
        return secondMax;
    }
}
```

21. *Write a java program to input N (N is user input) numbers and find out all the duplicate numbers in the array.*

    Answer:

```
import java.util.*;

public class PQ21_Q21 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        // Input the size of the array
        System.out.print("Enter the number of elements: ");
        int N = scanner.nextInt();

        // Input the array elements
        System.out.println("Enter the elements:");
        int[] array = new int[N];
        for (int i = 0; i < N; i++) {
            array[i] = scanner.nextInt();
        }

        // Find duplicate elements
        List<Integer> duplicates = findDuplicates(array);
```

```
        // Display duplicate elements
        if (duplicates.isEmpty()) {
            System.out.println("No duplicate elements found.");
        } else {
            System.out.println("Duplicate elements:");
            for (int num : duplicates) {
                System.out.println(num);
            }
        }

        scanner.close();
    }

    public static List<Integer> findDuplicates(int[] nums) {
        List<Integer> result = new ArrayList<>();
        HashMap<Integer, Integer> map = new HashMap<>();

        // Count occurrences of each number
        for (int num : nums) {
            map.put(num, map.getOrDefault(num, 0) + 1);
        }

        // Add numbers with occurrence > 1 to result list
        for (Map.Entry<Integer, Integer> entry : map.entrySet()) {
            if (entry.getValue() > 1) {
                result.add(entry.getKey());
            }
        }

        return result;
    }
}
```

22. Write a java program to merge two sorted arrays.

Answer:

```
import java.io.BufferedReader;
import java.io.InputStreamReader;

public class Question_22
{
        public static void main(String args[]) throws Exception
        {

                //merge two sorted arrays

                BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
                System.out.print("enter no of inputs for 1st array : ");
                int n1 = Integer.parseInt(br.readLine());
                int arr1[] = new int[n1];
                System.out.println("enter inputs in sorted order for 1st array : ");
                for(int i = 0; i<n1; i++) {
                        arr1[i] = Integer.parseInt(br.readLine());
                }
                System.out.print("enter no of inputs for 2nd array : ");
                int n2 = Integer.parseInt(br.readLine());
                int arr2[] = new int[n2];
                System.out.println("enter inputs in sorted order for 2nd array : ");
                for(int i = 0; i<n2; i++) {
                        arr2[i] = Integer.parseInt(br.readLine());
                }

                System.out.println("1st array : ");
                for(int val : arr1) { System.out.print(val + " "); }

                System.out.println("2nd array : ");
```

```
                for(int val : arr2) { System.out.print(val + " "); }

                int mergeArr[] = new int[n1+n2];
                int i=0,j=0,k=0;
                while(i<n1 && j<n2) {
                        if(arr1[i]>arr2[j]) {
                                mergeArr[k] = arr2[j];
                                j++;
                        }
                        else {
                                mergeArr[k] = arr1[i];
                                i++;
                        }
                        k++;
                }
                while(i<n1) {
                        mergeArr[k] = arr1[i];
                        i++;
                }
                while(j<n2) {
                        mergeArr[k] = arr2[j];
                        j++;
                }
                System.out.println("merge array : ");
                for(int val : mergeArr) { System.out.print(val + " "); }
        }
}
```