# LAB # 11

Task No 01:

Create a Java GUI application that provides the user usage of Ohm's Law formula. In electrical circuits, Ohm's law states that the current through a conductor between two points is directly proportional to the potential difference or voltage across the two points, and inversely proportional to the resistance between them, provided that the temperature remains constant.

The mathematical equation that describes this relationship is:

$$I = \frac{V}{R} \quad \text{or} \quad R = \frac{V}{I} \quad \text{or} \quad V = I \cdot R$$

where V is the potential difference measured across the resistance in units of volts; I is the current through the resistance in units of amperes and R is the resistance of the conductor in units of ohms. More specifically, Ohm's law states that the R in this relation is constant, independent of the current.

The law was named after the German physicist Georg Ohm, who, in a treatise published in 1827, described measurements of applied voltage and current through simple electrical circuits containing various lengths of wire. He presented a slightly more complex equation than the one above to explain his experimental results. The above equation is the modern
form of Ohm's law.
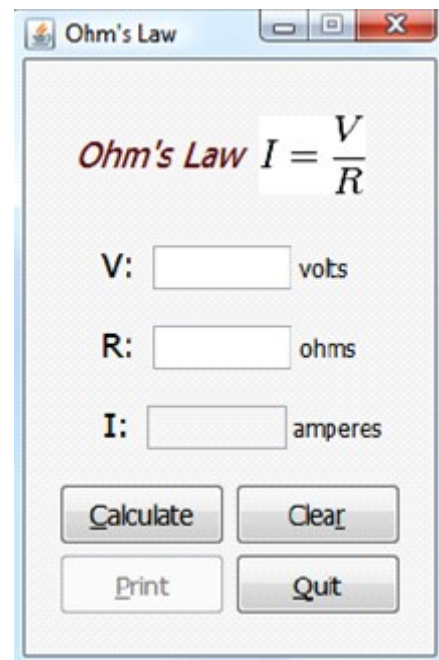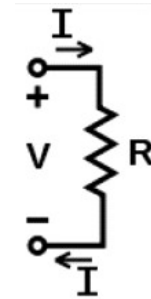
Code:

```java
public class TableGeneration extends javax.swing.JFrame {

    public TableGeneration() {
        initComponents();
    }
    @SuppressWarnings("unchecked")
    private void initComponents() {

        jLabel3 = new javax.swing.JLabel();
        number = new javax.swing.JTextField();
        jButton1 = new javax.swing.JButton();
        jButton2 = new javax.swing.JButton();
        jScrollPane1 = new javax.swing.JScrollPane();
        table = new javax.swing.JTextArea();
```

```java
        setDefaultCloseOperation(javax.swing.WindowConstants.EXIT_ON_CLOSE);

        jLabel3.setFont(new java.awt.Font("Tahoma", 0, 12)); // NOI18N
        jLabel3.setText("Enter Number to Generate Table");
        jButton1.setText("Generate");
        jButton1.addActionListener(new java.awt.event.ActionListener() {
            public void actionPerformed(java.awt.event.ActionEvent evt) {
                jButton1ActionPerformed(evt);
            }
        });
        jButton2.setText("Clear");
        jButton2.addActionListener(new java.awt.event.ActionListener() {
            public void actionPerformed(java.awt.event.ActionEvent evt) {
                jButton2ActionPerformed(evt);
            }
        });
        table.setColumns(20);
        table.setRows(5);
        jScrollPane1.setViewportView(table);

        javax.swing.GroupLayout layout = new
javax.swing.GroupLayout(getContentPane());
        getContentPane().setLayout(layout);
        layout.setHorizontalGroup(
                layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
                        .addGroup(layout.createSequentialGroup()
                                .addContainerGap()
                                .addGroup(layout.createParallelGroup(javax.swing.Grou
pLayout.Alignment.LEADING)
                                        .addGroup(layout.createSequentialGroup()
                                                .addGap(34, 34, 34)
                                                .addComponent(jButton1)
                                                .addGap(18, 18, 18)
                                                .addComponent(jButton2)
                                                .addGap(0, 0, Short.MAX_VALUE))
                                        .addGroup(layout.createSequentialGroup()
                                                .addGroup(layout
                                                        .createParallelGroup(javax.sw
ing.GroupLayout.Alignment.LEADING)
                                                        .addGroup(layout.createSequen
tialGroup()
                                                                .addComponent(number,
                                                                        javax.swing.G
roupLayout.PREFERRED_SIZE, 228,
                                                                        javax.swing.G
roupLayout.PREFERRED_SIZE)
                                                                .addGap(0, 0,
Short.MAX_VALUE))
                                                        .addComponent(jLabel3,
                                                                javax.swing.GroupLayo
ut.Alignment.TRAILING,
                                                                javax.swing.GroupLayo
ut.DEFAULT_SIZE, 247,
                                                                Short.MAX_VALUE))
                                                .addContainerGap()))))
```

```java
                        .addGroup(layout.createSequentialGroup()
                                .addGap(18, 18, 18)
                                .addComponent(jScrollPane1,
javax.swing.GroupLayout.PREFERRED_SIZE, 228,
                                        javax.swing.GroupLayout.PREFERRED_SIZE)
                                .addGap(0, 0, Short.MAX_VALUE)));
        layout.setVerticalGroup(
                layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
                        .addGroup(layout.createSequentialGroup()
                                .addContainerGap()
                                .addComponent(jLabel3,
javax.swing.GroupLayout.PREFERRED_SIZE, 25,
                                        javax.swing.GroupLayout.PREFERRED_SIZE)
                                .addPreferredGap(javax.swing.LayoutStyle.ComponentPla
cement.RELATED)
                                .addComponent(number,
javax.swing.GroupLayout.PREFERRED_SIZE, 28,
                                        javax.swing.GroupLayout.PREFERRED_SIZE)
                                .addPreferredGap(javax.swing.LayoutStyle.ComponentPla
cement.UNRELATED)
                                .addGroup(layout.createParallelGroup(javax.swing.Grou
pLayout.Alignment.BASELINE)
                                        .addComponent(jButton1)
                                        .addComponent(jButton2))
                                .addPreferredGap(javax.swing.LayoutStyle.ComponentPla
cement.RELATED)
                                .addComponent(jScrollPane1,
javax.swing.GroupLayout.PREFERRED_SIZE, 148,
                                        javax.swing.GroupLayout.PREFERRED_SIZE)
                                .addContainerGap(42, Short.MAX_VALUE)));

        pack();
    }
    private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {
        int base, i, n;
        base = Integer.parseInt(number.getText());
        table.setText("");
        for (i = 1; i <= 10; i++) {
            n = base * i;
            table.append(base + " × " + i + " = " + n + "\n");
        }

    }
    private void jButton2ActionPerformed(java.awt.event.ActionEvent evt) {

        number.setText("");
    }
    public static void main(String args[]) {

        java.awt.EventQueue.invokeLater(new Runnable() {
            public void run() {
                new TableGeneration().setVisible(true);
            }
        });
    }
```
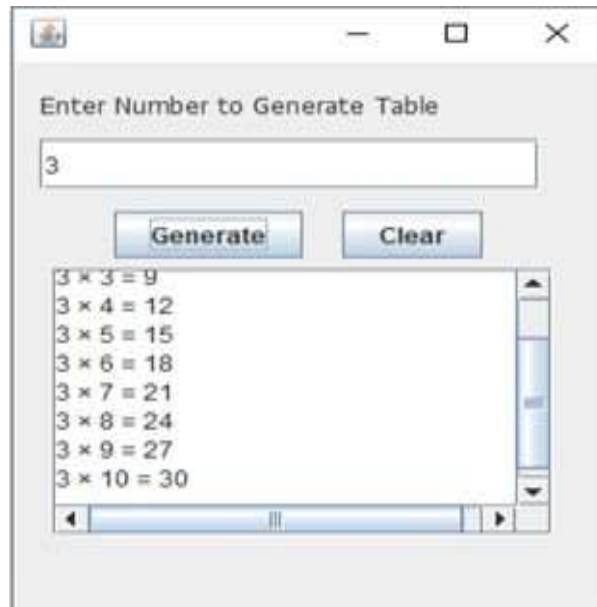
```java
    private javax.swing.JButton jButton1;
    private javax.swing.JButton jButton2;
    private javax.swing.JLabel jLabel3;
    private javax.swing.JScrollPane jScrollPane1;
    private javax.swing.JTextField number;
    private javax.swing.JTextArea table;
}
```

Output:

Task No 02: Create a GUI application that prints the multiplication table of any given number.

Code:

```java
public class Ohms_law extends javax.swing.JFrame {

    public Ohms_law() {
        initComponents();
    }
    @SuppressWarnings("unchecked")
    private void initComponents() {
        jPanel1 = new javax.swing.JPanel();
        jLabel1 = new javax.swing.JLabel();
        jLabel2 = new javax.swing.JLabel();
        jLabel3 = new javax.swing.JLabel();
        jLabel4 = new javax.swing.JLabel();
        current = new javax.swing.JTextField();
        voltage = new javax.swing.JTextField();
        resistance = new javax.swing.JTextField();
        jButton1 = new javax.swing.JButton();
        jButton4 = new javax.swing.JButton();
        jLabel8 = new javax.swing.JLabel();
        jLabel9 = new javax.swing.JLabel();
        jLabel10 = new javax.swing.JLabel();
        jLabel11 = new javax.swing.JLabel();
        jButton3 = new javax.swing.JButton();
```

```java
        jButton2 = new javax.swing.JButton();
        setDefaultCloseOperation(javax.swing.WindowConstants.EXIT_ON_CLOSE);
        jLabel1.setFont(new java.awt.Font("Tahoma", 0, 18)); // NOI18N
        jLabel1.setText("I :");
        jLabel2.setText("volts");
        jLabel3.setFont(new java.awt.Font("Tahoma", 0, 18)); // NOI18N
        jLabel3.setText("R :");
        jLabel4.setFont(new java.awt.Font("Tahoma", 0, 18)); // NOI18N
        jLabel4.setText("V :");
        current.setText(" ");
        voltage.setText(" ");
        voltage.addActionListener(new java.awt.event.ActionListener() {
            public void actionPerformed(java.awt.event.ActionEvent evt) {
                voltageActionPerformed(evt);
            }
        });
        resistance.setText(" ");
        jButton1.setText("Print");
        jButton4.setText("Calculate");
        jButton4.addActionListener(new java.awt.event.ActionListener() {
            public void actionPerformed(java.awt.event.ActionEvent evt) {
                jButton4ActionPerformed(evt);
            }
        });
        jLabel8.setFont(new java.awt.Font("Segoe UI Emoji", 3, 24)); // NOI18N
        jLabel8.setForeground(new java.awt.Color(255, 51, 51));
        jLabel8.setText("Ohm's Law");
        jLabel9.setBackground(java.awt.Color.white);
        jLabel9.setFont(new java.awt.Font("Tahoma", 0, 18)); // NOI18N
        jLabel9.setText("I=V/R");
        jLabel10.setText("amperes");
        jLabel11.setText("ohms");
        jButton3.setText("Clear");
        jButton3.addActionListener(new java.awt.event.ActionListener() {
            public void actionPerformed(java.awt.event.ActionEvent evt) {
                jButton3ActionPerformed(evt);
            }
        });
        jButton2.setText("Quit");
        jButton2.addActionListener(new java.awt.event.ActionListener() {
            public void actionPerformed(java.awt.event.ActionEvent evt) {
                jButton2ActionPerformed(evt);
            }
        });
        javax.swing.GroupLayout jPanel1Layout = new javax.swing.GroupLayout(jPanel1);
        jPanel1.setLayout(jPanel1Layout);
        jPanel1Layout.setHorizontalGroup(
            jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
            .addGroup(jPanel1Layout.createSequentialGroup()
                .addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
                    .addGroup(jPanel1Layout.createSequentialGroup()
                        .addGap(57, 57, 57)
```

```java
                        .addComponent(jLabel8,
javax.swing.GroupLayout.PREFERRED_SIZE, 133, javax.swing.GroupLayout.PREFERRED_SIZE)
                        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.U
NRELATED)
                        .addComponent(jLabel9,
javax.swing.GroupLayout.PREFERRED_SIZE, 57, javax.swing.GroupLayout.PREFERRED_SIZE))
                    .addGroup(jPanel1Layout.createSequentialGroup()
                        .addGap(72, 72, 72)
                        .addGroup(jPanel1Layout.createParallelGroup(javax.swing.Group
Layout.Alignment.TRAILING)
                            .addGroup(jPanel1Layout.createSequentialGroup()
                                .addGroup(jPanel1Layout.createParallelGroup(javax.swi
ng.GroupLayout.Alignment.LEADING, false)
                                    .addGroup(jPanel1Layout.createSequentialGroup()
                                        .addComponent(jLabel4)
                                        .addPreferredGap(javax.swing.LayoutStyle.Comp
onentPlacement.RELATED)
                                        .addComponent(voltage))
                                    .addGroup(jPanel1Layout.createSequentialGroup()
                                        .addComponent(jLabel3)
                                        .addPreferredGap(javax.swing.LayoutStyle.Comp
onentPlacement.RELATED)
                                        .addComponent(resistance))
                                    .addGroup(jPanel1Layout.createSequentialGroup()
                                        .addComponent(jLabel1)
                                        .addPreferredGap(javax.swing.LayoutStyle.Comp
onentPlacement.UNRELATED)
                                        .addComponent(current,
javax.swing.GroupLayout.PREFERRED_SIZE, 124,
javax.swing.GroupLayout.PREFERRED_SIZE)))
                                .addPreferredGap(javax.swing.LayoutStyle.ComponentPla
cement.RELATED)
                                .addGroup(jPanel1Layout.createParallelGroup(javax.swi
ng.GroupLayout.Alignment.LEADING)
                                    .addComponent(jLabel2)
                                    .addComponent(jLabel11)
                                    .addComponent(jLabel10)))
                            .addGroup(javax.swing.GroupLayout.Alignment.LEADING,
jPanel1Layout.createSequentialGroup()
                                .addGroup(jPanel1Layout.createParallelGroup(javax.swi
ng.GroupLayout.Alignment.TRAILING, false)
                                    .addComponent(jButton1,
javax.swing.GroupLayout.Alignment.LEADING, javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)
                                    .addComponent(jButton4,
javax.swing.GroupLayout.Alignment.LEADING, javax.swing.GroupLayout.DEFAULT_SIZE, 87,
Short.MAX_VALUE))
                                .addPreferredGap(javax.swing.LayoutStyle.ComponentPla
cement.RELATED)
                                .addGroup(jPanel1Layout.createParallelGroup(javax.swi
ng.GroupLayout.Alignment.LEADING, false)
                                    .addComponent(jButton3,
javax.swing.GroupLayout.DEFAULT_SIZE, 87, Short.MAX_VALUE)
```

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```java
                                        .addComponent(jButton2,
javax.swing.GroupLayout.DEFAULT_SIZE, javax.swing.GroupLayout.DEFAULT_SIZE,
Short.MAX_VALUE))))))
                .addContainerGap(32, Short.MAX_VALUE))
        );
        jPanel1Layout.setVerticalGroup(
            jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADI
NG)
            .addGroup(jPanel1Layout.createSequentialGroup()
                .addContainerGap()
                .addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.A
lignment.BASELINE)
                    .addComponent(jLabel9, javax.swing.GroupLayout.PREFERRED_SIZE,
40, javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel8, javax.swing.GroupLayout.PREFERRED_SIZE,
28, javax.swing.GroupLayout.PREFERRED_SIZE))
                .addGap(18, 18, 18)
                .addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.A
lignment.BASELINE)
                    .addComponent(jLabel4, javax.swing.GroupLayout.PREFERRED_SIZE,
25, javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(voltage, javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel2))
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                .addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.A
lignment.BASELINE)
                    .addComponent(jLabel3, javax.swing.GroupLayout.PREFERRED_SIZE,
25, javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(resistance, javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel11))
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                .addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.A
lignment.BASELINE)
                    .addComponent(jLabel1, javax.swing.GroupLayout.PREFERRED_SIZE,
28, javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(current, javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel10))
                .addGap(40, 40, 40)
                .addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.A
lignment.BASELINE)
                    .addComponent(jButton3)
                    .addComponent(jButton4))
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                .addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.A
lignment.BASELINE)
                    .addComponent(jButton1)
                    .addComponent(jButton2))
                .addContainerGap(32, Short.MAX_VALUE))
        );
        current.getAccessibleContext().setAccessibleName("current");
        voltage.getAccessibleContext().setAccessibleName("voltage");
        resistance.getAccessibleContext().setAccessibleName("resistance");
```

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```java
        javax.swing.GroupLayout layout = new
javax.swing.GroupLayout(getContentPane());
        getContentPane().setLayout(layout);
        layout.setHorizontalGroup(
            layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
            .addGroup(layout.createSequentialGroup()
                .addComponent(jPanel1, javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, javax.swing.GroupLayout.PREFERRED_SIZE)
                .addGap(0, 10, Short.MAX_VALUE))
        );
        layout.setVerticalGroup(
            layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
            .addComponent(jPanel1, javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, javax.swing.GroupLayout.PREFERRED_SIZE)
        );
        pack();
    }
    private void jButton3ActionPerformed(java.awt.event.ActionEvent evt)
{

        voltage.setText("");
        resistance.setText("");
        current.setText("");
        voltage.requestFocus();
    }
    private void voltageActionPerformed(java.awt.event.ActionEvent evt)
{


    }
    private void jButton4ActionPerformed(java.awt.event.ActionEvent evt)
{


        float volts, resist, cur;
        volts = Float.parseFloat(voltage.getText());
        resist = Float.parseFloat(resistance.getText());
        cur = volts/resist;
        current.setText(cur+"");
    }
    private void jButton2ActionPerformed(java.awt.event.ActionEvent evt)
{
                System.exit(0);
    }
    public static void main(String args[]) {
        java.awt.EventQueue.invokeLater(new Runnable() {
            public void run() {
                new Ohms_law().setVisible(true);
            }
        });
    }
    private javax.swing.JTextField current;
    private javax.swing.JButton jButton1;
    private javax.swing.JButton jButton2;
    private javax.swing.JButton jButton3;
    private javax.swing.JButton jButton4;
    private javax.swing.JLabel jLabel1;
```

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```java
    private javax.swing.JLabel jLabel10;
    private javax.swing.JLabel jLabel11;
    private javax.swing.JLabel jLabel2;
    private javax.swing.JLabel jLabel3;
    private javax.swing.JLabel jLabel4;
    private javax.swing.JLabel jLabel8;
    private javax.swing.JLabel jLabel9;
    private javax.swing.JPanel jPanel1;
    private javax.swing.JTextField resistance;
    private javax.swing.JTextField voltage;
}
```

Output: