**Submission Form**

**Fill up the following slots with appropriate content. You must submit the content of this document from this page only.**

1. Your Name: Md Raihanul Islam Bhuiyan
2. Your ID: 20101239
3. Your Section: 16
4. Experiment No: 2
5. Experiment Title: Verify Ohm’s Law
6. **You must write your ID in each of the graphs you insert here.**
7. **Data Table 1**:

|  |  |  |
| --- | --- | --- |
| **Sl:** | **Voltage, V (volt)** | **Electric Current, I (mA)** |
| 1. | 1 | 2.8 |
| 2. | 2 | 5.6 |
| 3. | 3 | 8.4 |
| 4 | 4 | 11.1 |
| 5 | 5 | 13.9 |
| 6. | 6 | 16.7 |
| 7. | 7 | 19.5 |
| 8. | 8 | 22.3 |

1. **Data Table 2:**

|  |  |  |
| --- | --- | --- |
| **Sl:** | **Voltage, V (volt)** | **Electric Current, I (mA)** |
| 1. | 1 | 4.5 |
| 2. | 2 | 9.1 |
| 3. | 3 | 13.6 |
| 4 | 4 | 18.2 |
| 5 | 5 | 22.7 |
| 6. | 6 | 27.3 |
| 7. | 7 | 31.8 |
| 8. | 8 | 36.4 |

1. **Data Table 3:**

|  |  |  |
| --- | --- | --- |
| **Sl:** | **Resistance, R (Ω)** | **Electric Current, I (mA)** |
| 1. | 100.0 | 57.0 |
| 2. | 200.0 | 28.5 |
| 3. | 300.0 | 19.0 |
| 4 | 400.0 | 14.3 |
| 5 | 500.0 | 11.4 |
| 6. | 600.0 | 9.5 |
| 7. | 700.0 | 8.1 |
| 8. | 800.0 | 7.1 |

1. Draw I vs V graph for Data Table 1 and 2, that is you plot V along the -axis and I along the -axis. You should label the axes accordingly. For two tables you will get two straight lines. You can either draw both the lines in the same graph or use two graphs; one for each table. You must label the lines such that we can identify the lines corresponding to the tables. Insert the **graph /graphs** here:

**Graph for Data Table 1:**

Chart, line chart

Description automatically generated

**Graph for Data Table 2:**

Chart, line chart

Description automatically generated

1. For Data Table 1,

Slope = 2.782142857 mA/V

Calculated Resistance,

R`\_1 =1000/SLOPE

= 359.4351733 Ω

Percentage of error

= [ **|** Calculated Resistance - Given Resistance **|** / Given Resistance ] \* 100

= [ | R`\_1- R\_1 | / R\_1 ] \* 100

= 0.1212%

For Data Table 2,

Slope = 4.552380952 mA/V

Calculated Resistance,

R`\_2 =1000/SLOPE

=219.665272 Ω  
  
Percentage of error

= [ **|** Calculated Resistance - Given Resistance **|** / Given Resistance ] \* 100

= [ **|** R`\_1- R\_1 **|** / R\_1 | ] \* 100

= 0.152 %

1. Draw I vs R graph for Data Table 3, that is you plot R along x-axis and I along y-axis. You should label the axes accordingly. Insert **graph-3** here:

Chart, line chart

Description automatically generated

You are ***strongly*** encouraged to use your **own words** to describe your thoughts. **However, any kind of plagiarism (such as copying from other students’ lab-reports) will not be tolerated and will be subject to disciplinary action according to BracU policy.**

Please briefly answer the following questions:

1. Explain the graph you see in step 12. [Hint: What kind of function does the curve represent? How does it relate to Ohm’s law?]  
   Ans:

From this graph, we can see that R and I will never be 0. Because the graph never touches the x and y axis.

From Ohm’s Law,

I=V/R

So I and V has a inverse relation. This is why the graph is hyperbolic.

1. What assumption do you have to make about the temperature for Ohm’s law to hold true? [ Write the assumption in one line. ]

Ans: Ohm’s Law states that, resistance is a constant value. But when temperature changes, Resistance also changes. So, we have to assume that temperature is constant so that Ohm’s law holds true.

1. Sketch **I-V** graphs for the following cases and identify which graph corresponds to which type of material?   
   a. Resistance increases linearly with temperature  
   b. Resistance decreases inversely with temperature

( Hint: You may ask yourself the question - Is this the graph for a Conductor/Semiconductor/Superconductor/Insulator?)  
  
You can either plot both the cases in the same graph or use two graphs; one for each case. Insert the graph/graphs here with the comment on the graph representing which material type. The comment should be precise and concise.

A piece of paper with writing

Description automatically generated with low confidence

* 1. When temperature decreases, resistance increases and I vs V graph is linear. This is a graph for metals.
  2. When the temperature increases, resistance decreases and I vs V graph is not linear. This is a graph for insulators.