In-Class Lab: Ohm's Law

Name: Date:

Instructor: Section:

For Online Submissions

Take a photo or scan a copy showing ALL calculations performed during this lab and upload it with this Lab Report in D2L.

Objective:

Describe in YOUR own words the objective of today's experiment. (1-2 sentences)

Data Analysis

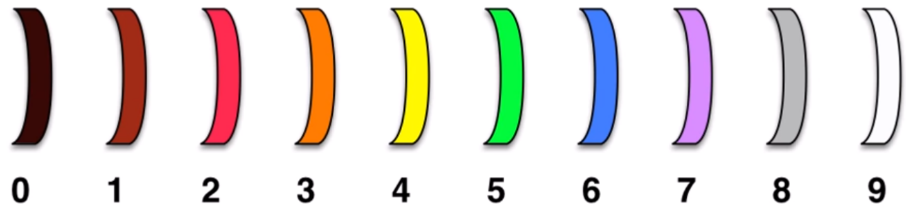
1. Series: Using Equivalent Circuits and the values for the resistors from Table 2, **Calculate the equivalent resistance for the Series circuit** shown in Figures 1 & 5 on Page 2 of the lab instructions.
   SHOW ALL OF YOR WORK!
   Enter the values in the Theory Resistance column of Table 3.

2. <u>**Parallel**</u>: Using Equivalent Circuits and the values for the resistors from Table 2, **Calculate the equivalent resistance for the Parallel circuit** shown in Figures 2 & 6 on Page 2 of the lab instructions.
   SHOW ALL OF YOR WORK!
   <u>Enter the values in the Theory Resistance column of Table 3</u>.

3. <u>**Series/Parallel**</u>: Using Equivalent Circuits and the values for the resistors from Table 2, **Calculate the equivalent resistance for the Series/Parallel circuit** shown in Figures 3 & 7 on Page 2 of the lab instructions.
   SHOW ALL OF YOR WORK!
   <u>Enter the values in the Theory Resistance column of Table 3</u>.

Part - B: How to Read a Resistor

1. Each resistor has four different color bands or stripes on it.
2. When reading a Resistor, orientate it so that gold or silver is the last band on the right.
3. Each color is represented by a number.



4. In the example below Brown is 1 and Blue is 6.

5. The 3rd stripe tells you the number of zeros to add. Orange is 3, so add 3 zero's.
6. That would be a Resistor Value of $\boxed{\mathbf{R = 16000\ \Omega \text{ or } 16\ k\Omega}}$
7. The 4th gold strip means that the resistor could be off by up to 5%. Ignore this for now.

Questions

1. Read and Record the Resistor value below. R =

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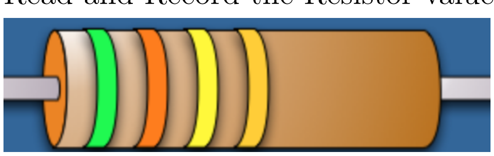

Data

Table 1: Voltage vs. Current

Voltage (**V**)	Zero Current (**mA**)	Measured Current (**mA**)	True Current (**mA**)

Table 2: Resistor Measurement Check Values

Resistor	**Resistance ($k\Omega$)**
R1	
R2	
R3	
R4	

Table 3: Equivalent Resistance

Circuit	**Theory Resistance, R_{theory} ($k\Omega$)**
Series	
Parallel	
Series/Parallel	

Table 4: Equivalent Circuits

Circuit	V_{out} (**V**)	I_{zero} (**mA**)	I_{avg} (**mA**)	I_{true} (**mA**)	$R_{experimental}$ (**kΩ**)	R_{theory} (**kΩ**)	$\%_{Error}$ (%)
Series							
Parallel							
Series/Parallel							

Conclusions:

1. As voltage increases, current (increases / decreases)

2. How well does your data support Ohm's Law? Explain fully!

3. What is the physical meaning of the slope of the Linear Fit to the data on the Ohm's Law graph? Hint: What are the units of the slope?
   Upload your graph with this Lab Report in D2L.

4. How well does the method of equivalent circuits work?

5. Compare the experimental resistance value, $R_{experimental}$ with the accepted value R_{theory} for each of the circuit setups in Table 4 using Equation 4 below. Record this value in the corresponding row in the $\%_{Error}$ column.

$$\%_{Error} = \left(\frac{R_{experimental} - R_{theory}}{R_{theory}} \right) \times 100 \tag{1}$$