ECEN 215 Post Lab Report

Fall 2024

Lab #1: Ohm's Law and Kirchhoff's Laws

Submitted by:

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Date Performed: 09/13/2024

Note: Lab report assignment has 100 points, including lab attendance (30 points) and this written lab report (70 points)

Section 1. Objective (10 points)

The Purpose of this lab was to expose students to applying what they have learned in the classroom into real life such as: Ohm's Law, Kirchov's Voltage Law, and the concepts of voltage dividers. This lab also serves as an introduction to using a multimeter to measure voltage and resistance in circuits.

Section 2. Procedures (10 points)

$$V_1 = V_s\left(\frac{R_1}{R_1+R_2}\right)$$ **Equation 1**

V1 is the voltage across the resistor, Vs is the voltage of the source, R1 is the resistor being measured, and R2 is the resistance of the second resistor.

$$C = \frac{x_2-x_1}{x_2} * 100\%$$ **Equation 2**

C is the percent difference, x2 is the final quantity, and x1 is the initial quantity

For 1.3 the lab required the connection of a 5V source to a 100 Ohm and 220 Ohm resistor in series. Since the nominal values of the resistors are not necessarily their actual resistance, the resistances of both the 100 Ohm and 220 Ohm resistors were measured. Likewise voltage coming from the voltage source was also measured for the same reason. Then V1 and V2 were calculated using the values collected thus far. Then a multimeter was used to measure V1 and V2. The error was then calculated for both V1 and V2.

For 1.4.1, the resistances of the photoresistor were measured while covered by cardstock, in ambient Light, and with a flashlight pointed at it. Then the photoresistor was placed in series with the 100 Ohm resistor (replacing the 220 Ohm resistor in the prior circuit). Then the voltage across the photoresistor was measured covered in cardstock, Ambient Light, and with a flashlight pointed at it.

For 1.4.2 the resistance of the thermistor provided was measured at room temperature, and then when heated up by skin friction. Then the photoresistor was replaced with the thermistor from the prior circuit and the voltage at room temperature was measured, then again when heated by skin friction.

Section 3. Difficulties

We did not have cardstock to cover the photoresistor so we decided to use our hands instead. We were not provided with a flashlight so we used the one on our phone. Other than that everything went smoothly.

Section 4. Results (40 points)

Measured resistor values (1.3a)

Resistor	Resistance (Ω)
100Ω	97.5Ω
220Ω	215.8Ω

Measured source voltage (1.3c)

Component	Voltage (v)
Source (V_s)	4.713v

Calculated voltage drop of resistors (1.3d)

Voltage drop of component	Voltage (v)
R_1 (V_1)	1.467v
R_2 (V_2)	3.246v

Measured voltage drop of resistors (1.3e)

Voltage drop of component	Voltage (v)
R_1 (V_1)	1.470v
R_2 (V_2)	3.240v

Percent difference of voltages (1.3f)

Measured Quantity	Percent error (%)
R_1 (V_1)	0.204%
R_2 (V_2)	0.185%

Resistance of photoresistor (1.4.1a)

Light Level	Resistance (Ω)

Covered (dark)	90.3 kΩ
Ambient Light (Neutral)	1.43 kΩ
Flashlight (High)	303 Ω

(1.4.1b) As the photoresistor is exposed to more light, the resistance reduces drastically. Conversely, as the photoresistor is exposed to less light, the resistance increases drastically.

Voltage across photoresistor (1.4.1c)

Light Level	Voltage (V)
Covered (dark)	4.52 V
Ambient Light (Neutral)	0.60 V
Flashlight (High)	0.077 V

(1.4.1d) As the photoresistor is exposed to more light, the voltage drop across it decreases. Referencing the voltage divider equation, as the resistance decreases, the proportion of the voltage drop seen by the photoresistor would also decrease.

Resistance of thermistor (1.4.2a)

Temperature	Resistance (Ω)
Ambient Temperature (Neutral)	10.15 Ω
Rubbed between palms (Warm)	6.14 Ω

(1.4.1b) As the thermistor is warmed, the resistance decreases.

Voltage across thermistor (1.4.2c)

Temperature	Voltage (V)
Ambient Temperature (Neutral)	2.557 V
Rubbed between palms (Warm)	2.414 V

(1.4.1d) As the thermistor is exposed to heat, the voltage drop across it decreases. Referencing the voltage divider equation, as the resistance decreases, the proportion of the voltage drop seen by the thermistor would also decrease.

Section 5. Conclusion (10 points)

This lab exposed us to measuring actual quantities such as voltage, Current, Resistance through different types of resistors that can vary their resistances when exposed to different “stimuli”. We also discovered that the photoresistor increases its resistance as the intensity of light increases while the thermistor decreases its resistance when exposed to heat.