ELEC 240
Lab 1 - Basic Electrical Measurements

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1 Objective

This lab focuses on the fundamental tools and skills for electrical engineering laboratory work. This includes making current, voltage, and resistance measurements with a digital multimeter, creating graphs in MATLAB, and producing and measuring sinusoids with an oscilloscope and function generator.

2 Materials

Your text here

Note (To be deleted): Provide a bullet point list of components, software tools, and hardware (such as the NI VirtualBench or DMM) used during the lab

3 Test Description

Your text here

Note (To be deleted): This section provides a summary of the test your team performed. Give enough information so readers can understand what you did, but do not go into the details of every step.

3.1 Pre-Lab Calculations and Schematics

Your text here

Note (To be deleted): Include the homework pre-calculations and schematics that serve as the initial setup for the test. Briefly explain the importance of each item you include. You may want to number your equations/figures so you can refer to them in later sections. Including photos of handwritten work is okay.

4 Results and Discussion

4.1 Experiment 1.1: The DMM

4.1.1 Part A: Measuring Voltage with the DMM

Note: We were unable to aquire multiple Double A batteries for the initial tests

- Measuring the voltage of a D battery: 1.62V
- Voltage of battery attached to Lightbulb: 1.53V, The voltage has dropped, as some energy is being used to power the bulb

4.1.2 Part B: Measuring Current with the DMM

- Current across the battery in the Lightbulb - Battery circuit: 59.5 mA
- Current across the NC circuit: 59.1 mA

4.1.3 Part C: Measuring Resistance with the DMM

- 330 Ohms Resistor - Measured 325.7 Ohms 430 Ohms Resistor - Measured 424 Ohms 2200 Ohms Resistor - Measured 2153 Ohms
- All resistors had a tolerance of 5%, which is in accordance with the measured values
- Holding the probes between your fingers opens a parallel path for the current to flow, which will lead to an inaccurate measure of the resistance of the circuit

- The resistance of two resistors in series is 2R + 2d, where d is the tolerance of a single resistor
- The resistance of two resistors in parallel is .5R + .5d, where d is the tolerance of a single resistor
- Measuring 10 resistors with a resistance of 4.6 kOhms and a tolerance of 5% In kOhms: 4.61, 4.61, 4.59, 4.61, 4.63, 4.61, 4.63, 4.60, 4.61, 4.62. All of these resistances fall within the tolerance
- Resistance of the body through dry fingers: 1.325 MOhms with a resolution of .1 MOhms
- Resistance of the body throuh wet fingers: 168 kOhms with a resolution of 10 kOhms
- This change in resistance can be attributed to the fact that adding water to fingers increases the surface area of the contact of the leads to the skin, which leads to a decrease in resistance. Following Ohms law, with dry skin, a voltage of 6.625 kV would produce 5 mA of current
- The resistance of the lightbulb is 4.8 Ohms. This is not the answer that we would expect from Ohm's law because a lightbulb is a non-Ohmic circuit element.
- The DMM reads .01 fewer volts that the Virtualbench power supply, hinting a voltage drop somewhere in the small circuit.
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- For a 1kOhm resistor, I = V/R holds for all V

4.2 Experiment 1.2 The Oscilloscope and Function Generator

4.2.1 Viewing Signals with te Oscilloscope

- The numbers are slightly off from the function generator because of two factors, the first being that the generator is not perfectly able to create the given sine waves, and the second being that the oscilloscope uses various measurements and approximations to create its given outputs which cannot be perfectly accurate.
- The

Note (To be deleted): The heart of your report is the presentation of your results and a discussion of those results. In your discussion, you should not only analyze your results, but also discuss the implications of those results.

5 References

Your text here

Note (To be deleted): List any datasheets, websites, lab procedure, etc. used during the lab.

6 Conclusion

Your text here

Note (To be deleted): While the "Results and Discussion" section focused on the test results individually, the "Conclusion" discusses the results in the context of the entire experiment. Usually, the objectives given in the "Introduction" are reviewed to determine whether the experiment succeeded. If the objectives were not met, you should analyze why the results were not as predicted.

7 Errors

Your text here

Note (To be deleted): Briefly list sources of error and discuss how to eliminate or deal with them