Raw Data Sheet

Student Name: _____

Team members:
1.- _____ 2.- _____

3.- _____ 4.- _____

Instructor: _____
Note: Show all your work, including all calculations!

Common resistor

Data

1. Obtain three resistors of nominal values 1, 5 and 10 K Ohms. Using the Digital Multimeter (DMM) measure the actual resistance of each resistor and record them.

2. Use the DMM to set the power supply to about 1 V (do not believe the gauge in the power supply). Connect the power supply to the 1 K Ohm resistor. Connect the DMM in parallel with the resistor to measure the voltage across it and record the voltage.

3. Turn off the power supply but do not change its settings. Set the DMM to measure current and connect it in series with the resistor. Turn on the power supply and measure the current flowing through the resistor. Record it.

4. Repeat your measurements for power supply voltages between 1 and 12 V with 2 V increments. Collect the same kind of data for another of the three resistors. Organize the data for each resistor in a table that includes headings and units. (At this point of the course, not including units leads to significant loss of points.) You should have six pairs of measurements per resistor.

Analysis

5. Make a voltage vs. current plot for each resistor. Find a linear fit for each of your resistors. The slope of this line is your experimental resistance value. Compare this value to the to the value measured for the corresponding resistor.

Resistors in Series

Data

1. Set the power supply to 10V $\pm$ 0.01V. Connect the power supply to the array of 3 resistors in series. Measure the voltage at the terminals of the power supply. Measure the voltage across each resistor.

2. Set the DMM to measure Direct Current in mA. Look at figure 1 and insert the DMM in series in location A to measure the current flowing from the power supply into R1. Similarly, measure the current flowing from R1 into R2 (location B), from R2 into R3 (location C), and from R3 back into the power supply (location D).

3. Construct a table with headings that include units for each resistor. Include a column for the actual value measured of each resistor, a column for the voltage across and another column for current flowing through each resistor.

Analysis

4. For the resistor indicated by your instructor, Use Ohmś law and your measurements of current and resistance, to calculate the voltage drop across the resistor indicated by your instructor. Compare with the measured value.

5. Calculate the theoretical value of the equivalent resistance for the three resistors connected in series.

6. Use Ohmś Law and your measurements of Voltage drop of, and current supplied by, the power supply to determine the equivalent resistance and compare with your calculated value from question 5.

Resistors in parallel

Data

1. Refer to figure 2. Connect the three resistors in parallel. Set the power supply to only 5V +/- 0.01V and then connect it to the circuit. Measure the voltage across the terminals of the power supply. Also, measure the voltage across each resistor (X,Y,Z).

2. Set the multimeter to measure Direct Current in mA. Measure the current through each resistor (A,B,C) as well as the current going back into the power supply (location D). Organize your data in a table similar to that of the previous section.

Analysis

1. Use your voltage and resistance measurements along with Ohmś Law to calculate the current for the resistor indicated by your instructor. Compare with your measured value.

2. Calculate the theoretical value of the equivalent resistance for the three resistors connected in parallel.

3. Use Ohmś Law to determine the equivalent resistance and compare with your calculated value from question 5. (Note that here you need the input voltage and current coming out of the power supply.)