ECE112 - Lab 5

Purpose

- Observe current division in a circuit
- Reasoning about the Wheatstone Bridge

Parts/tools needed:

- Assembled and properly working power supply
- Wall wart and big pad board
- Diagonal cutters and pliers
- Digital Multimeter (DMM)

Observing KCL within a circuit

1. Select seven random-valued resistors with values between 750 Ω and 9.1KΩ. Build the circuit shown in the schematic diagram of figure 1 on the big pad protoboard. Mark the values of the resistors in your circuit on lines below the resistor reference designators on this schematic.

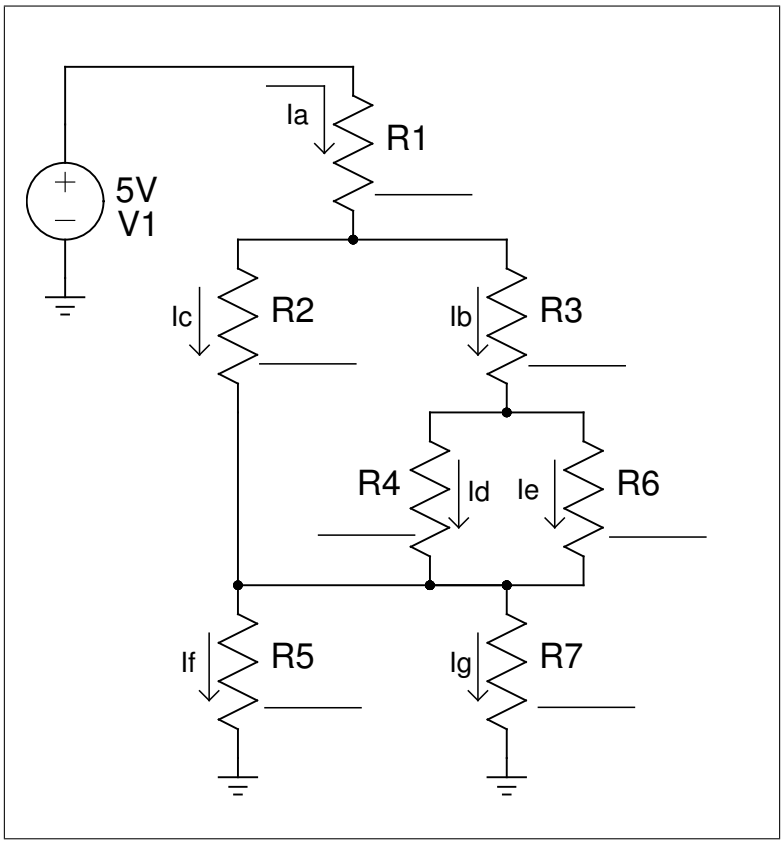

Figure 1: KCL Test Circuit

2. Using your DMM, measure the voltage across the resistors. Knowing their values, and Ohm's law, determine if the following are true. In each box show your measurements, calculations, and conclusions.

(a) $I_a = I_c + I_b$

(b) $I_b = I_d + I_e$

(c) $I_a = I_f + I_g$

(d) $I_f + I_g = I_c + I_d + I_e$

3. Consider the circuit in figure 2. For questions (a)-(e), simply use your reasoning and observation of how the circuit is structured. You don't need any calculations or measurements for this part. In fact, you would be hard pressed to solve this circuit with the circuit analysis tools you have now.

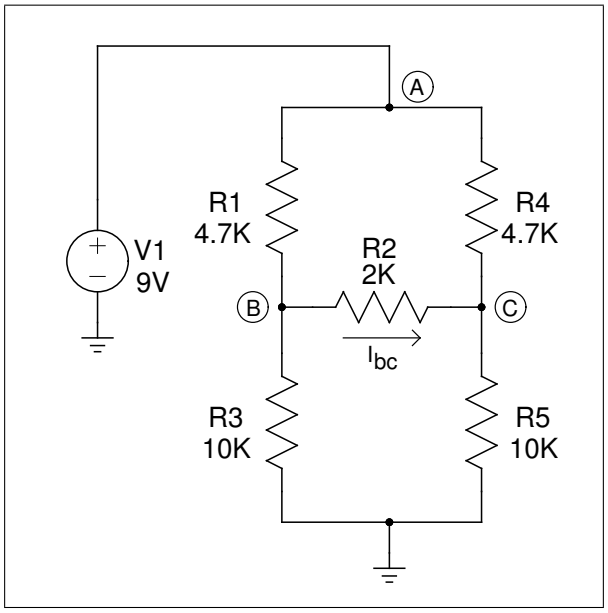

Figure 2: The Wheatstone Bridge

(a) What is the value of I_{bc} by reasoning only?

(b) What is the value of V_{bc} by reasoning only?

(c) Would changing R2 vary the value of V_{bc}. Use your reasoning only.

(d) Would varying V1 change the value of V_{bc}? Use your reasoning only.

(e) Would varying V1 change the value of I_{bc}?

(f) Now build the circuit and record your measurements of:

I_{bc} _____

V_{bc} _____

Were you correct in your reasoning? Why or why not?

(g) Make a summary statement about what conditions in this circuit causes V_{bc} and I_{bc} to be zero.

4. Have your TA check off your work.