Name: ______________________________ Section: __________ Date: ______________

Datasheet - Exp 16: Series and Parallel Circuits

PROCEDURE

Part 1: Series Circuit

Record all data in tables on next page.

Recall that (i = 1, 2, . . . , n)

1. Measure each R_i, then construct a series circuit (Fig. 16.4) with 100-Ω, 200-Ω, and 300-Ω resistors and ammeter (200 mA DCA); **do not connect the power supply yet.**

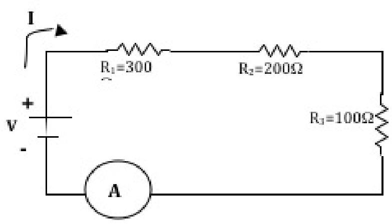

Fig. 16.4

2. Draw the schematic using measured R_i Values.
3. Calculate $R_{eq}$for the circuit.
4. Measure $R_{eq}$by plugging an ohmmeter in place of the power supply.
5. Remove the ohmmeter and connect the unplugged power supply and a voltmeter (DCV) to your circuit.

   Get instructor approval of your circuit
6. Always be sure the power supply is turned off before you plug it into an outlet. Plug in the power supply, and set the voltage to 1.00 V. Measure the current and voltage.
7. Record the current (A) and the voltage (V) as you increase the voltage in 1.0 V increments up to 4.0 V.
8. Leave the voltage at 4.0 V; disconnect the voltmeter from the power supply. Maintaining the same orientation of the leads (if clockwise, black follows red), measure V_i, the voltage drop across each resistor.
9. Add these potential differences ($\sum_{i=1} V_i$).
10. Does $\sum_{i=1} V_i$ equal -4.0 V? If not, ask your TA for guidance.

Part 2: Parallel Circuit

11. Repeat Part 1, Step 1 - Step 8, for the parallel circuit (Fig. 16.5).

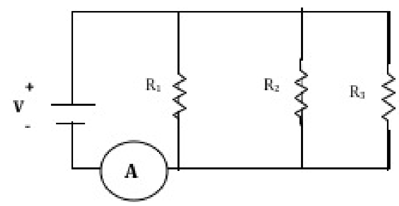

Fig. 16.5

Things to consider when writing your report:

Does $V_2 = V_1 + V_A$, or does $V_2 = V_1 = V_3$? Are each of these values negative or positive?! *Yes*, it matters!

Does $V = |V_1 + V_A|$?

Part 3: Combination Circuit

12. Repeat Part 1, Step 1 - Step 8, for the combination circuit (Fig. 16.6).

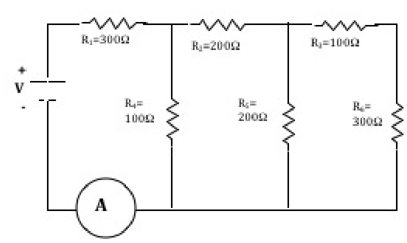

Fig. 16.6

Part 4: Graphing

13. Graph I *vs.* V for each of the first three circuits (*Part 1*, *Part 2*, and *Part 3*).

Resistors:

R_i	Measured
R_1	
R_2	
R_3	
R_4	
R_5	
R_6	
R_A	

Measured Data:

	I_{Part1}	V_{Part1}	I_{Part2}	V_{Part2}	I_{Part3}	V_{Part3}
1.0 V						
2.0 V						
3.0 V						
4.0 V						

Circuit Data:

	Part 1	Part 2	Part 3
Calc R_{eq}			
Meas R_{eq}			
Graph R_{eq}			
V_A			
V_1			
V_2			
V_3			
V_4	X	X	
V_5	X	X	
V_6	X	X	

Questions

1. Why should the voltage drops (electric potential differences) across the resistors connected in parallel be the same? Were your values equal?

2. Calculate the equivalent resistance of each of the first three circuits you constructed for this experiment using your measured values. Show each step in this process (math and schematic). Remember to include R_A in your calculations.

3. Calculate the equivalent resistance of each circuit using the slope from your graphs.

4. Calculate Percent error for Measured R_{eq}compared to Calculated R_{eq}, and for Graph R_{eq}compared to Calculated R_{eq}. Use these in your discussion of data.