NAME _____

EET 1150 Lab 5
Parallel Circuits

OBJECTIVES:

- Verify the equation for total equivalent resistance of resistors in parallel.
- Measure resistance, currents, and voltages in parallel circuits, and verify that the measured values agree with theoretical predictions.
- Verify that Kirchhoff's Current Law correctly predicts currents in parallel circuits.

PROCEDURE:

1. Select the resistors shown in Table A. Measure and record their actual resistances. **Throughout this lab, round all values to three significant digits.**

TABLE A: Resistor Values

Resistor I.D.	Nominal Value	Actual Value
R_1	1 kΩ	
R_2	3.3 kΩ	
R_3	4.7 kΩ	
R_4	5.6 kΩ	

2. For each of the parallel combinations shown below, predict the total resistance. Record your predictions in Table B. Then build each combination on the breadboard and measure its total resistance. Record in Table B, along with percentage errors.

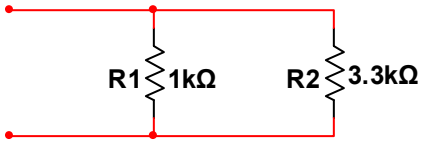


Fig.1

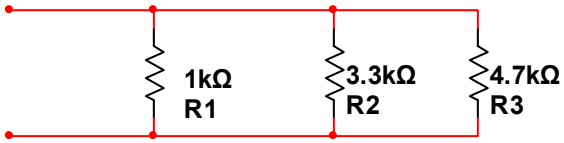


Fig.2

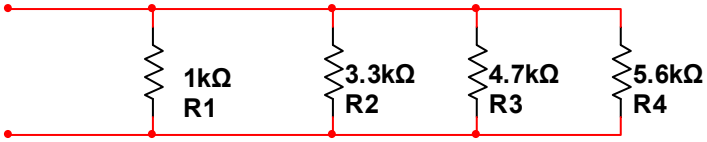
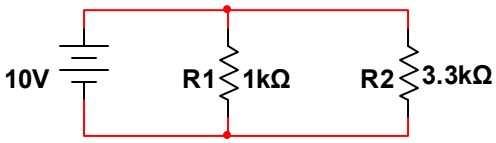


Fig.3

TABLE B: Total Equivalent Resistance

Figure	Predicted R_T	Measured R_T	DMM Range Used	% Error
Figure 1				
Figure 2				
Figure 3				

3. Consider Circuit 1, shown in the schematic diagram below. Use your knowledge of parallel circuits to predict the quantities listed in Table C. (I_T is total current.) Record your predictions in the table. Then build the circuit and measure these quantities. Record your measured values, along with percentage errors.

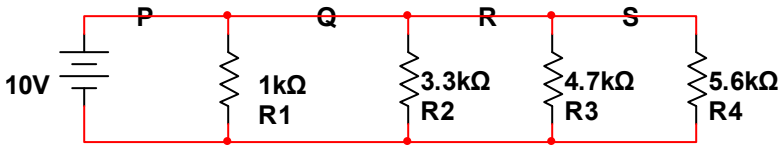


Circuit.1

TABLE C: Currents and Voltages in Circuit 1

Quantity	Predicted Value	Measured Value	DMM Range Used	% Error
I_1				
I_2				
I_T				
V_1				
V_2				

4. Now build Circuit 2, shown in the diagram below, by adding two more parallel resistors. (For the time being, ignore the points labeled P, Q, R, and S.) Predict and measure the quantities listed in Table D.



Circuit 2

TABLE D: Currents and Voltages in Circuit 2

Quantity	Predicted Value	Measured Value	DMM Range Used	% Error
I_1				
I_2				
I_3				
I_4				
I_T				
V_1				
V_2				
V_3				
V_4				

5. Now that you know the current through each resistor, use Kirchhoff's Current Law to predict the currents listed in Table E. Then measure these currents. Some of these measurements are tricky. It may help to redraw the circuit with the symbol for an ammeter inserted at the correct point in the circuit; then build the circuit from your drawing. (After you insert the ammeter, some resistors that were originally in parallel may not be in parallel anymore.)

TABLE E: Currents in Circuit 2 by KCL

Quantity	Predicted Value	Measured Value	DMM Range Used	% Error
I_P				
I_Q				
I_R				
I_S				

QUESTIONS: (Type your answers on another sheet.)

1. Based on your data in Table B, what happens to total equivalent resistance as more parallel resistors are added?
2. Again based on Table B, total equivalent resistance is closest in value to which of the resistors?
3. When the additional resistors were added in going from Circuit 1 to Circuit 2, what changes, if any, took places in the circuit's voltages?
4. When the additional resistors were added in going from Circuit 1 to Circuit 2, what changes, if any, took places in the circuit's currents?
5. Based on your data for Circuit 2, is **Kirchhoff's Current Law** satisfied in this circuit? Explain, giving **one specific example** of how this law either is or is not satisfied in the circuit, using actual measured values. Include some discussion of percentage error.