Name: _____ **Lab Section:** _____ **Date:** _____

OVERVIEW:

This laboratory introduces analog and digital multi-meters used to measure resistance. The focus will be on determining nominal resistance, measuring actual resistance, and finding the relative difference between expected and actual results.

INTRODUCTION:

For this exercise you will need a Volt-Ohm-Milliampere meter (VOM) and a Digital MultiMeter (DMM).

Remember when asked to calculate relative difference to compare A (measured) with B (nominal) the ECET method is: RD = (A - B) / B, expressed in percent.

A fixed molded carbon composition resistor may have 4 or 5 color bands to identify it. The first two bands are the first and second digit of the resistance value. The third band is the multiplier, or the number of zeros that will follow the first two digits. The fourth band is the tolerance band and the fifth (when used) is the reliability factor.

An example of resistor identification follows:

First Band	*Red*
Second Band	*Yellow*
Third Band	*Orange*
Fourth Band	*Gold*

The bands may be decoded as follows:

Red	*Yellow*	*Orange*	*Gold*	
2	4	x 10^3	± 5%	= 24000 ± 5%

This resistor has a nominal value of 24 kΩ and a tolerance of ± 1.2 kΩ. The resistor value can be anywhere between the minimum value of 22.8 kΩ and the maximum value of 25.2 kΩ.

You can use the following website for help:

http://www.csgnetwork.com/resistcolcalc.html

PROCEDURE:

1. Position a proto-board in front of you at your lab station. Choose any 4 differing resistors from your parts kit: R_A, R_B, R_C, R_D. You will need to identify them and record the values in the spaces provided on the following page. You will then measure the resistor using both the analog and digital meters and record the measured values. Finally compare the measured values with the nominal value based on the color code.

R_A Color Bands:	**1**	**2**	**3**	**4**

Nominal Value _____

Minimum Value _____ **Maximum Value** _____

Measured Value _____ **(on VOM)** _____ **(on DMM)**

Relative Difference _____ **(of VOM)** _____ **(of DMM)**

R_B Color Bands:	**1**	**2**	**3**	**4**

Nominal Value _____

Minimum Value _____ **Maximum Value** _____

Measured Value _____ **(on VOM)** _____ **(on DMM)**

Relative Difference _____ **(of VOM)** _____ **(of DMM)**

R_C Color Bands:	1	2	3	4

Nominal Value _____

Minimum Value _____ **Maximum Value** _____

Measured Value _____ **(on VOM)** _____ **(on DMM)**

Relative Difference _____ **(of VOM)** _____ **(of DMM)**

R_D Color Bands:	1	2	3	4

Nominal Value _____

Minimum Value _____ **Maximum Value** _____

Measured Value _____ **(on VOM)** _____ **(on DMM)**

Relative Difference _____ **(of VOM)** _____ **(of DMM)**

R_E Color Bands:	1	2	3	4

Nominal Value _____

Minimum Value _____ **Maximum Value** _____

Measured Value _____ **(on VOM)** _____ **(on DMM)**

Relative Difference _____ **(of VOM)** _____ **(of DMM)**

2. Position your resistors R_A and R_B on the proto-board such that one end of each are connected together through internal connections of the board creating a series configuration. Measure the resistance of this combination.

   Equivalent Resistance _____

   How does this equivalent resistance compare to the individual resistances? Does this agree with any equation you know? Explain.

3. Now position your resistors R_C and R_D on the proto-board such that the ends of each are connected together through the internal connections of the board creating a parallel configuration. Measure the resistance of this combination.

   Equivalent Resistance _____

   How does this equivalent resistance compare to the individual resistances? Does this agree with any equation you know?

   Which meter did you find to be most accurate during this lab, and is that what you expected? Explain.

REPORTING:

Once you have completed your measurements, have your lab instructor check and sign off on your work. Clean up your bench, turn off and unplug all equipment at your bench, return all equipment to its proper location, clean all trash and debris off your bench and deposit it in the trash receptacle.

Turn you completed lab worksheets in to your lab instructor.