“experiment 1”

The Objectives:

• To introduce the Multimeter, the breadboard, the power supply, resistors and their color code.

• To learn to properly use the lab instruments and the correct method of measuring electrical quantities with each instrument.

Theory :

Ohm's law states that the current through a conductor between two points is directly proportional to the voltage across the two points. Introducing the constant of proportionality, the resistance .one arrives at the usual mathematical equation that describes this relationship

$$I = \frac{V}{R}$$

Equipments :

- Digital Multimeter (DMM)
- Power Supply (PS)
- Breadboard
- Resistors
- Wires

Procedure :

- We use the DMM to know the value of two resistors that we need.
- Then we use the color code to calculate the value of resistors
- We compare Measured values that we have measured by ohm meter with the real values and they were in space
- We connect the resistors on the breadboard to make the circuit such that :
- R1 series with R2 and voltage source
- We measure the voltage across each resistor

Experiment's calculations :

1] Use the DMM to measure the resistance of the three resistors provided in the table

	R1	R2	R3
Bands Color	Orange, white, red, gold	Red, violet, red, gold	Green, blue, orange gold
Theoretical Value	$(3.705 - 4.095)k\Omega$	$(2.505 - 2.895)k\Omega$	$(55.805 - 56.195)k\Omega$
Measured Value by (DMM)	3.84kΩ	2.66kΩ	55.57kΩ

Now we will use the color table and rule in the box to calculate The theoretical value:

$$\boxed{1}\,\boxed{2} \times 10^{\boxed{3}} + \boxed{4}$$

Color	Band value
Black	**0**
Brown	**1**
Red	**2**
Orange	**3**
Yellow	**4**
Green	**5**
Blue	**6**
Violet	**7**
Gray	**8**
White	
Gold	
Silver	

(1):show the first band color .

(2): show the second band color .

(3): show the third band color .

(4): show the last band color which usually be gold or silver(tolerance).

Now our Theoretical Value :

R1 = $\mathbf{39 \times 10^2 \pm 5\% = (3.9 \pm 5\%)k\Omega = [3.705 - 4.095]k\Omega}$

R2 = $\mathbf{27 \times 10^2 \pm 5\% = (2.7 \pm 5\%)k\Omega = [2.505 - 2.895]k\Omega}$

R3 = $\mathbf{56 \times 10^3 \mp 5\% = (56 \pm 5\%)k\Omega = [55.805 - 56.195]k\Omega}$

3] Compare your measurements with the actual values. Do the actual values lie within tolerance? Show your calculations.

Yes, they are similar

R1=3.84kΩ belong to the interval $[3.705 - 4.095]k\Omega$

R2=2.66kΩ belong to the interval $[2.505 - 2.895]k\Omega$

R3=55.57kΩ belong to the interval $[55.805 - 56.195]k\Omega$

5] Setup your DC PS to 3 volts. Measure this with your DMM.

The DMM show 3.001volt

6] Are the values on the display equal to the DMM reading? Why?

Its bigger because the DMM is designed to show 2 digits and there is hidden digit that maybe is bigger than one and its dropped in wires

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7] Place the resistors R1 = 2.7 KΩ, R2= 3.9KΩ on the breadboard. Setup the PS to 8 volts and connect it to the resistor

8] Measure the voltage across R1,R2 and the current through the resistor. Do these values match with what you expect theoretically?

	Measured value	**Theoretically value**
VR1	**3.28v**	**3.267v**
VR2	**4.73v**	**4.719v**

Theoretically value:

$$*Req = R1 + R2 = 2.7\ k\Omega + 3.9k\Omega = 6.6k\Omega$$

$$*I = \frac{V}{Req} = \frac{8\ V}{6.6k\Omega} = 1.21mA$$

$$*VR1 = I \times R1 = 1.21mA \times 2.7k\Omega = 3.267V$$

$$*VR2 = I \times R2 = 1.21mA \times 3.9k\Omega = 4.719V$$

Conclusion :

- the theoretical values are not completely equal to the values of the experiment.
- We learned how to calculate the value of resistance through the colors written on it.
- We learned to use important new equipment like DMM and PS.