

ملاحظة مهمة جداً جداً جداً : هذا الريبورت وغيره ليس للنقل
الحرفي .. هو مجرد وسيلة للمساعدة وأخذ الأفكار حول الطريقة
الصحيحة لكتابة ريبورت (غير هيك مبروك عليكم علامة الصفر ..
اللهم بلغت اللهم فاشهد)

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<<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

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

Equipment :

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

Procedure :

- We use the DMM to measure the resistance of the three resistors provided.
- Then we calculate the value of resistors from the color code (the colorful lines that drawn in each resistor)
- We compare our measurements with the actual values and they were so close
- We build the circuit on the breadboard like that :
(R2 parallel with R3) then series with R1 and voltage source
- We measure the voltage across each resistor

There are some calculations we have done about this experiment :

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

	R 1	R2	R3
Bands color	White ,brown , red ,gold	Red ,black ,red ,brown	Brown ,green ,orange ,gold
Theoretical value	8.645 – 9.555 K Ω	1.70 – 2.30 K Ω	14 .25 -15.57 k Ω
Measured value by Dmm	9.0515 K Ω	1.9947 K Ω	14.747 K Ω

Note that The theoretical value was calculated using color table and this rule :

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

Color	Band value

Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Gray	8
White	9
Gold	5%
Silver	10%

The first number (1): represent the first band color that closer to the edge of resistor .

The second number (2): represent the second band color .

The third number (3): represent the third band color .

The first number (1): represent the last band color which usually be gold or silver.

Then in our experiment

$$R1 = 91 * 10^2 \pm 5\% = 9100 \pm 455 = [8645-9555] \Omega$$

$$R2 = 20 * 10^2 \pm 15\% = 2000 \pm 300 = [1700-2300] \Omega$$

$$R3 = 15 * 10^3 \pm 5\% = 15000 \pm 750 = [14250-15750] \Omega$$

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

Yes, they are

$$R1 = 9.0515 \text{ K} \in [8.645-9.555] \text{ k}\Omega$$

$$R2 = 1.9947 \text{ K} \in [1.700-2.300] \text{ k}\Omega$$

$$R3 = 14.747 \text{ K} \in [14.250-15.750] \text{ k}\Omega$$

4] Holding one probe between the thumb and forefinger of each hand, measure and record the value of your body resistance between your hands.

I notice that our bodies have a very big resistance up to $2.04 \cdot 10^6 \Omega$

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

The DMM show 4.9961 volt

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

No , because there is voltage drop in wires

7] Place the resistors $R1 = 2 \text{ K}\Omega$, $R2 = 15 \text{ K}\Omega$, , $R3 = 9.1 \text{ K}\Omega$ on the breadboard. Setup the PS to 10 volts and connect it to the resistor

8] Measure the voltage across $R1, R2, R3$, and the current through each resistor and the current through the resistor. Do these values match with what you expect theoretically?

Measured value ($VR1 = 2.623 \text{ volt}$, $VR2 = 7.37 \text{ volt}$, $VR3 = 7.37$)

Theoretically value :

We find total current I

$$**R_{eq} = \frac{1}{\frac{1}{15} + \frac{1}{9.1}} + 2 = 5.66 \Omega$$

$$**I = V/R_{eq} = 10 \div 5.66 = 1.3048 \text{ A}$$

$$**VR1 = I \cdot R1 = 1.3048 \cdot 2 = 2.6096 \text{ V}$$

$$**VR2 = VR3 = V_{total} - VR1 = 10 - 2.6096 = 7.3904 \text{ V}$$

Conclusion :

- 1] we learn the importance of the resistor's colors ,what they mean and how to calculate their resistance
- 2] we notice that our bodies have a large resistance which protect us .
- 3] we learn how to use some important Equipment like DMM and PS.



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Experiment "1" (Lab. Equipment Familiarization)

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