King Abdul Aziz University
Faculty of Science
Physics Department
Year: 1433/ 1434
Term: 2

Course: 281

Report number (1)

"Sample Report"

Name of Experiment: Ohm's Law

Student's Name: fill with your name

Student's Number: your computer number

Lab partners' name: write the names of the students that worked with you

Instructor's Name: your lab teacher name

Objective:

1. Verification of Ohm's Law.
3. To measure an unknown resistance.
4. To determine the equivalent resistance of two resistors connected on parallel and on series

Apparatus:

Variable DC voltage supply, resistors, connecting wires, ammeter and voltmeter.

Equations:

1. Ohm's law states that:

$$V = IR$$

Where:

V: is the potential difference across the resistor (measured in volts).
I : is the current through the resistor (measured in amperes).
R : is the constant of proportionality called the resistance of the conductor (measured in ohms).

2. If two resistors R_1 and R_2 are connected then

$$V = R_{eq} I$$

Where R_{eq} is the equivalent resistance given by the following:

a) Resistors connected on series:

$$R_{eq} = R_1 + R_2$$

b) Resistors connected in parallel

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}$$

Procedure:

- Part (1):

1. First we connect the circuit.
2. Adjusting the power supply, we read the voltage (V) and current (I) from the Voltmeter and Ammeter, respectively.
3. Then we repeat step 2 with different values of (V) and (I) and tabulate the results.
4. Plot the graph between (I) on the vertical axis and (V) on the horizontal axis to calculate the resistance theoretically from the slope.
5. We measure the resistance again by using the multi-meter and compare it with the resistance obtained from the graph.

- Part (2)

6. Connect two known resistances in Series.
7. Connect them to the circuit and measure V and I, then calculate R_{eq}.
8. Compare between R_{eq} from step 7 and theoretical.
9. Repeat steps 6 and 7 but in Parallel.
10. Compare between R_{eq} from step 7 and theoretical.

Data:

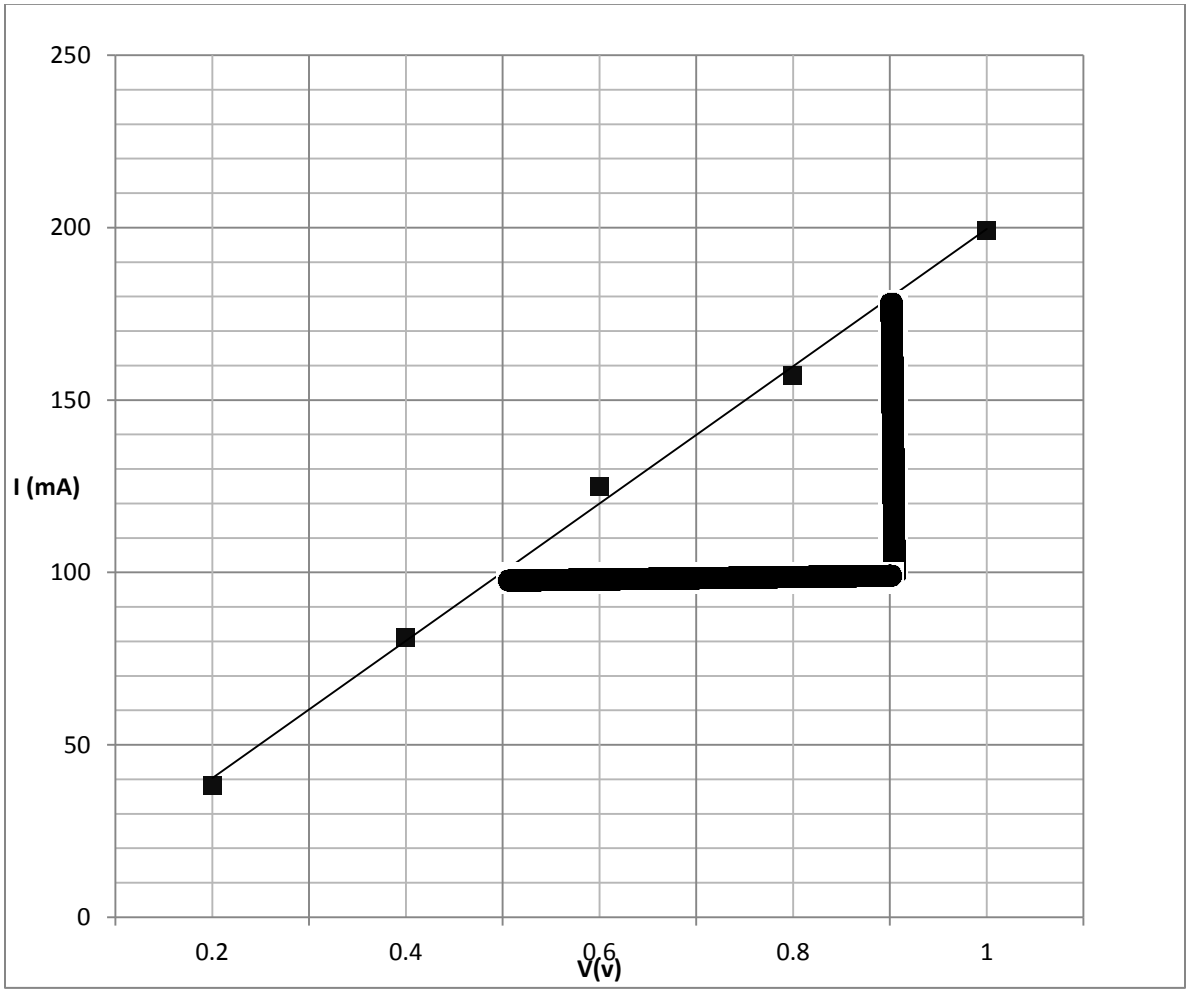
- Part (1): Ohm's law

V (v)	I (mA)
0.2	38
0.4	81
0.6	125
0.8	157
1	199

- Part (2): Resistors in series and parallel:
  R_1= 5 Ohm , R_2 = 3 Ohm

	V(v)	I(mA)	R_{eq} =V/I (Ohm)	R_{eq} theoretical (Ohm)
In Series	0.5	60	8.33	8
In parallel	0.5	268	1.866	1.875

Graph:



Calculations and results:

Part (1):

From graph : Slope = $\frac{(180-100)\times10^{-3}}{0.9-0.5} = \frac{80\times10^{-3}}{0.4} = 0.2\ A/v$

$\rightarrow$ R= 1/slope = 5 Ohm

Part (2):

Finding percentage error in R_{eq}

In series: $\%error = \left|\frac{8-8.33}{8}\right| \times 100 = 4\ \%$

In parallel:

$$\%error = \left|\frac{1.875 - 1.866}{1.875}\right| \times 100 = 0.5\ \%$$

Answers to questions:

Q1) If you want to maximize the current passing between two points in a circuit how should you connect two resistors between them?

Answer: Connect them in parallel.