

## EXPERIMENT 5

### Ohm's Law

#### GOAL

- To learn to construct simple electric circuits
- To learn to measure current and a voltage using multimeters
- To observe how the voltage changes with the change of the current
- To state Ohm's Law

#### THEORY

Ohm's Law states that the voltage  $V$  across a conductor is proportional to a current  $I$ , which flows through it, considering that all physical conditions and temperatures remain constant during the measurements. The coefficient of proportionality  $R$  is the resistance of this conductor. Mathematically, Ohm's Law can be presented as follows:

$$V = RI \quad (1)$$

#### PROCEDURE

##### Use of multimeters

Modern multimeters can be used to measure various parameters of circuits. In this experiment we use multimeters for measuring the voltage and current. To measure the voltage of a circuit element, we have to switch the multimeter to voltmeter mode and connect it in parallel to the circuit element. To measure the current, we have to switch the multimeter to the ammeter mode and connect it in series to the circuit element.

##### Electrical circuit

Figure 1 provides the diagram of the simple series circuit, which will be used in this experiment.

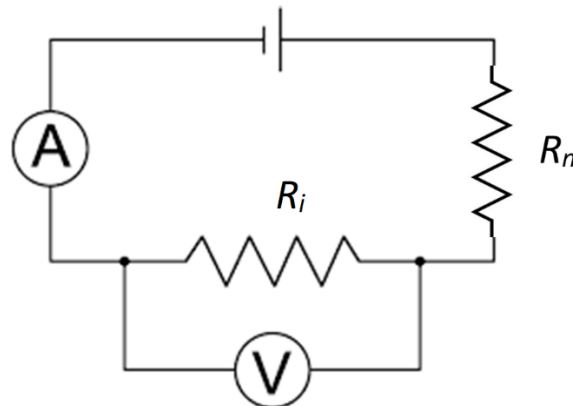


Figure 1. Electrical Circuit

In this experiment the voltage will be measured across the resistor  $R_i$ . The current flowing through  $R_i$  will be varied by changing the series of resistors  $R_n$ .

### Measurements

1. Built the circuit shown in Figure 1.
2. Perform measurements for various values of  $R_n$  and complete the following table using the readings of the voltmeter and ammeter.

$R_n$ (Ohms)	$V$ (Volts)	$I$ (Milliamps)

3. Create a graph  $V$  vs.  $I$  using Excel program.
4. Based on your best-fit analysis, estimate the resistance of the resistor  $R_i$ .