

# EXPERIMENT 1

## DC MEASUREMENTS, OHM'S LAW

**OBJECTIVE:** To introduce the measurements of DC voltage, current and resistance and know how to measure current and voltage at different places of a circuit

### EQUIPMENT

Digital Multimeter (DMM)  
Avometer (AVO8)  
Power Supply  
Resistors

### PRELIMINARY WORK

**P1** In the circuit of Figure 1.1 Calculate  $V_1$ ,  $V_2$ ,  $V$  and  $I$ . Verify the voltage divider rule and KVL ( $V_1 + V_2 = -V$ )

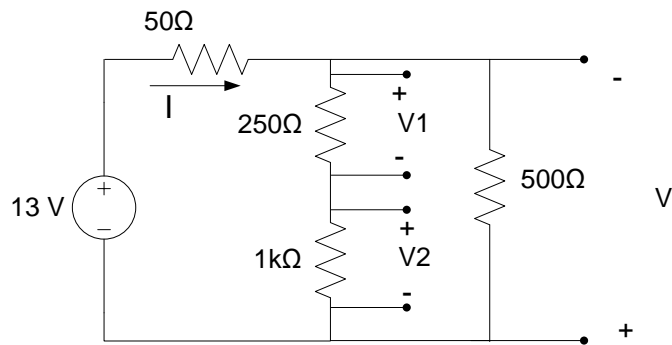


Figure 1.1

**P2** In the circuit of Figure 1.2 Calculate  $I_1$ ,  $I_2$ ,  $I$ , and  $V_x$ . Verify the current divider rule and KCL ( $I_1 + I_2 = I$ )

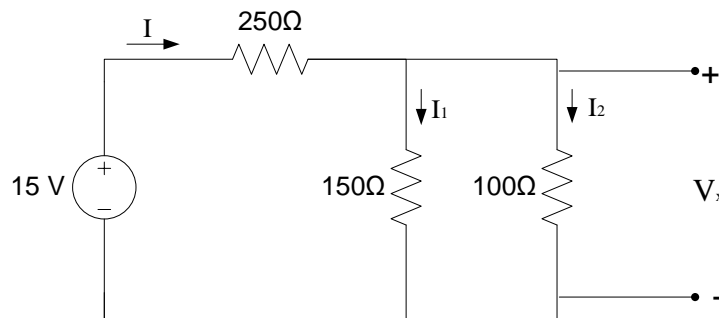
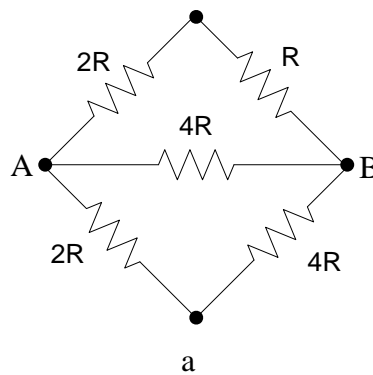


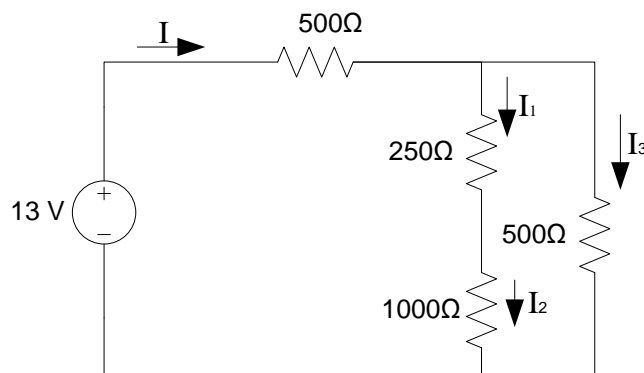
Figure 1.2

**P3**

- In the circuit of Figure 1.3 Calculate the equivalent resistance between points AB in terms of R,  $R_{AB}=?$
- In the circuit of Figure 1.3 What must be the value of R if the equivalent resistance between terminals AB is  $R_{AB}=333,33 \Omega$ ?
- Obtain the I-V plot between terminals A-B for the configuration given in Figure 1.3 for  $R=250 \Omega$  by varying  $V_{AB}$  from -20 to 20V

**Figure 1.3**

**P4** Calculate the power supplied by the DC source. Verify the power supplied by the source by summing individual power consumed by the resistors.

**Figure 1.4**

## EXPERIMENTAL WORK

**E1** Setup the circuit given in Figure 1.1. Verify the theoretical values found in preliminary work.

$V_1(\text{DMM})$	$V_2(\text{DMM})$	$V(\text{DMM})$	$V_1(\text{AVO8})$	$V_2(\text{AVO8})$	$V(\text{AVO8})$	$I(\text{AVO8})$

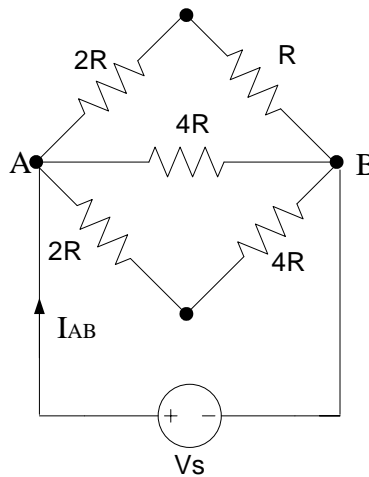
**E2** Setup the circuit given in Figure 1.2. Verify the theoretical values found in preliminary work.

Theoretical (Preliminary Work)				Experimental Work			
$I$	$I_1$	$I_2$	$V_x$	$I$	$I_1$	$I_2$	$V_x$

**E3.** For the circuit given in Figure 1.3,

- Measure the equivalent resistance between terminals AB by using ohm's law  
(Apply a suitable voltage value and measure the current on the main branch)
- Measure the equivalent resistance between terminals AB by using DMM  
 $R_{AB} = ?$

- Obtain the I-V plot of the configuration given in Figure 1.5 by varying source voltage from -20 to 20V. Measure  $V_{AB}$  and  $I_{AB}$ , then plot  $I_{AB}$  versus  $V_{AB}$ . From the plot calculate equivalent resistance  $R_{AB}$ .



**Figure 1.5**

**E4** Set up the circuit given in Figure 1.4. Fill in the table given below.

<b>I</b>	<b>I<sub>1</sub></b>	<b>I<sub>2</sub></b>	<b>I<sub>3</sub></b>	<b>V<sub>1</sub></b>	<b>V<sub>2</sub></b>	<b>V<sub>3</sub></b>	<b>P<sub>source</sub></b>	<b>P<sub>1</sub></b>	<b>P<sub>2</sub></b>	<b>P<sub>3</sub></b>	<b>P<sub>4</sub></b>

**CONCLUSION**

**C1** Consider experimental results of E1, which measurement device is more reliable? (AVO8 or DMM) Explain briefly.

**C2** Compare the resistance values you measured in E3. Which result is close to the value found in preliminary work P3a?

**C3** Consider experiment results of E4, Did you observe the conservation of power? Is there any difference between experimental and theoretical results? Explain briefly.