

ECE281
Electrical Circuits and Instrumentation + Laboratory
Fall 2016/2017
LAB # 1

3.10.2016

Objective:

To learn the basic measurement and calculation techniques in electronics,

1. How to find resistance by using Ohm's Law
 2. How to find power by using the formula $P = I.V$
 3. How to find the Energy consumed.
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1. How to measure Resistance:(15 Points)

For the most accurate measurement, test the resistance of a component individually. Remove the component from the circuit or test it before you install it. Testing the component while still in the circuit can cause inaccurate readings from other components. If you are testing a circuit or even just removing a component, be sure that all power to the circuit is turned off before proceeding.

Procedure:

1. Construct the circuit given in Figure-1a on the breadboard. Do not connect any power. Fill up Table 1 (Rows 1-6), according to the resistance measurement configurations.

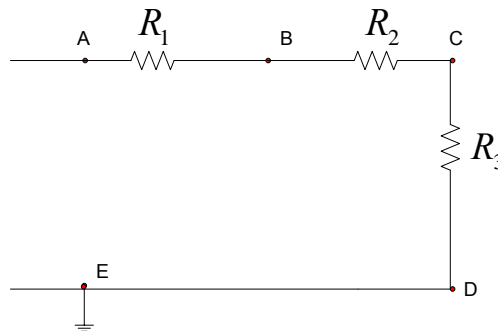


Figure 1a

The resistor values are: $R_1 = 1 \text{ k}\Omega$, $R_2 = 10 \text{ k}\Omega$, $R_3 = 2.2 \text{ k}\Omega$

- After carefully checking all the connections, connect the positive terminal of the DC voltage source as in Figure-3b between nodes A and E. Measure the resistance value between nodes D and C and fill up Table-3 (Rows 7 and 8)

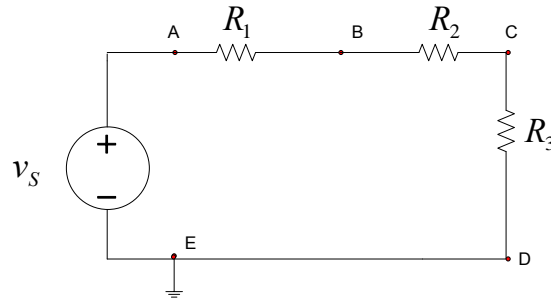


Figure 1b

Table- 1

Measurements	Nodes (points)		Resistances
	Black probe	Red probe	Digital Multimeter
1	D	C	
2	C	D	
3	A	B	
4	B	A	
5	B	C	
6	C	B	
7	D (power on)	C (power on)	
8	C (power on)	D (power on)	

Questions:

- What happens when the leads of the multi-meter are interchanged?
- What happens to the reading when power is applied at points A and E?
- Can resistance be measured is the circuit is connected to a power supply?
- In the experiment up to step 6 no power was applied, how the pointer of the multi meter moved without a voltage source?

2. How to find the resistance by using Ohm's Law:(15 Points)

Ohm's low states that, the voltage versus current characteristics is a linear relation for a linear time invariant resistor and the ratio of the voltage to the current value

for this reason is constant and it is called as the resistance. Hence Ohm's law is given by the formula,

$$R = \frac{V}{I} \quad (1)$$

where 'V' is the voltage measured in Volts across the resistor in Volts, 'I' is the current measured through the resistor in Amperes and 'R' is the resistance in Ohms (Ω).

Procedure:

1. Construct the circuit given in Figure-2 on the breadboard. Use digital multi meter to measure the voltage and current. (You will be given 2 different resistors: $R=1k\Omega$ and $10k\Omega$)

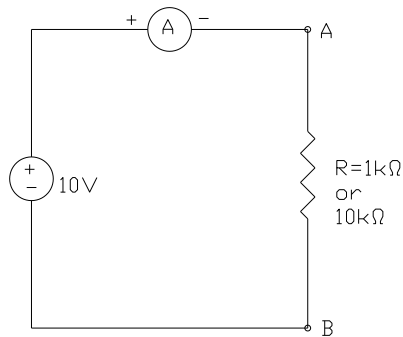


Figure 2

2. Change resistor to a different one and repeat the voltage and current measurements, fill up Table-2 with these measurements and calculated values of Resistors, Power and Energy for each case.

Table- 2

	R (Measured)	Voltage	Current	R (Calculated)	Power (calculated)	Energy (Calculated)
1						
2						