ECE 281

Electrical Circuits and Instrumentation + Laboratory

Fall 2016/2017

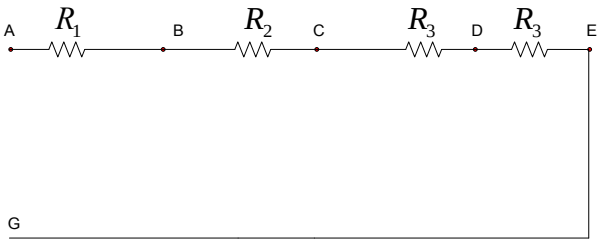
LAB # 4

1. To verify $R_T=R_1+R_2+….+R_n$ in series circuit: (25 Points)

Procedure:

1. Construct the circuit given in Figure-3 on the breadboard **without power**.

Figure 1: Circuit for resistance measurements.



R_1=1kΩ, R_2=100Ω, R_3=2.2kΩ, R_4=1.8kΩ,

2. Use digital multi meter for resistors.
3. Find resistive values between A-B, B-C, C-D, D-E, and A-E. Fill Table 2 with these values.
4. Calculate total resistance by using $R_T=R_1+R_2+ R_3+R_4$ and compare it with the resistance between A-E.

Table 1: Resistance measurements

Measurement no:	Between nodes	Resistance value
1.	A and B	
2.	B and C	
3.	C and D	
4.	D and E	
5.	A and E	

Questions:

- Is total resistance measured and calculated equal each other?

2. To verify Kirchhoff's Voltage Law: (25 Points)

Procedure:

1. Use the previous circuit, just add a voltage source as shown in Figure 4. (V_S=10 Volt.)
2. Use digital multimeter as voltmeter and make voltage measurements for the circuit according to the probe connections shown in Table 3 and fill up the table.
3. Find the total algebraic voltage drop over the closed circuit.

$$V_{total\_drop} = V_{AB} + V_{BC} + V_{CD} + V_{DE} + V_{EA}$$

$$V_{total\_drop} = V_{BA} + V_{CB} + V_{DC} + V_{ED} + V_{AE}$$

4. Verify the results with your measurements.

Figure 2: Circuit for voltage measurements.

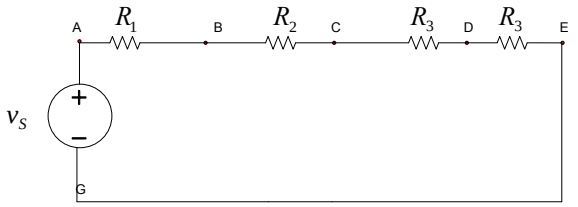


Table 2: Voltage measurements.

Measurement No:	Probe connections		Voltage	Probe connections		Voltage
	Red probe	Black probe		Black probe	Red probe	
1	A	B	V_{AB}=	A	B	V_{BA}=
2	B	C	V_{BC}=	B	C	V_{CB}=
3	C	D	V_{CD}=	C	D	V_{DC}=
4	D	E	V_{DE}=	D	E	V_{ED}=
5	E	A	V_{EA}=	E	A	V_{AE}=

Questions:

- Write down the Kirchhoff's voltage law in words.
- Why the sum of voltages is zero in both cases.