

ECE 281
Electrical Circuits and Instrumentation + Laboratory
Fall 2016/2017
LAB # 5

31.10.2016

Objective:

To learn about parallel circuit and Kirchhoff's Current Law

1. To verify $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_3}$ in parallel circuit
2. To verify Kirchhoff's Current Law
3. Learn the use of rheostat

1. To verify $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_3}$ in parallel circuit (10 Points)

Procedure:

1. Measure each resistor and construct the circuit given in Figure-1 on the breadboard.

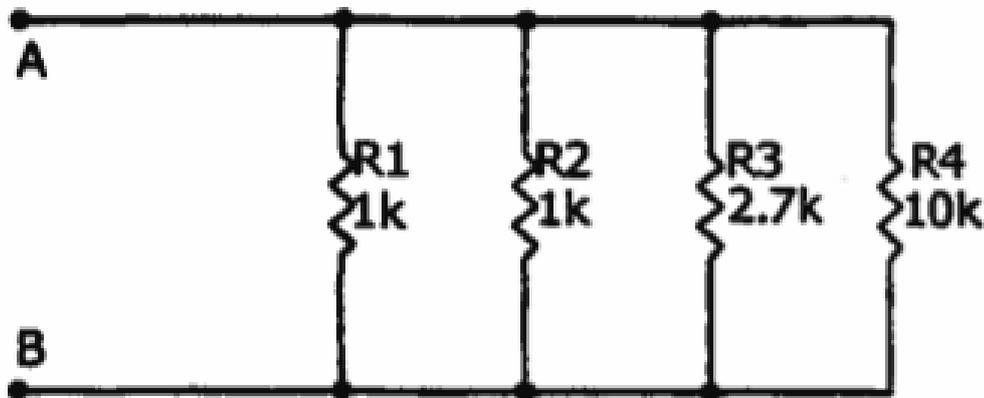


Figure 1

2. Measure resistance between A-B.
3. Calculate total resistance (R_{eq}) between A-B and compare with the measure value.
4. Remove R_4 , measure resistance between A-B.
5. Add again, and remove R_1 , measure resistance between A-B.

Questions:

- The total resistance is less than $1k\Omega$, why is this so?
- When R_1 removed the change in resistance is not large, why is this so?
- When R_4 removed the change in resistance is not large, why is this so?

2. To Verify Kirchhoff's Current Law (20 Points)

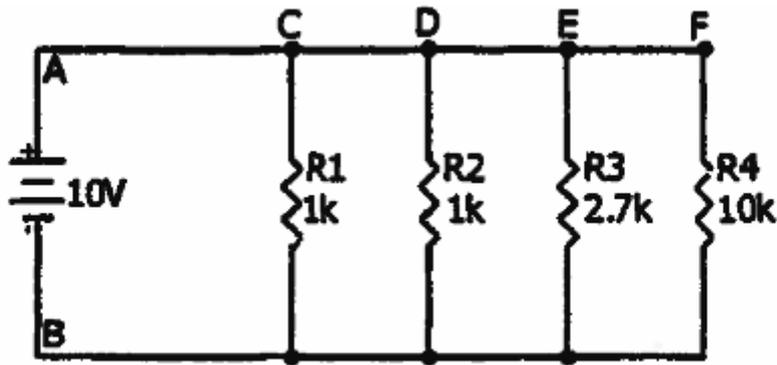


Figure 2

Procedure:

1. Take the digital multimeter and set the range to 40 mA dc.
2. Construct the circuit shown in figure 2 on the breadboard. Do not connect the positive of the supply to the circuit.
3. Connect the red lead of multimeter to the positive of the power supply and black lead to the point C in the circuit.
4. Measure the current and record it in Table 1.
5. Now remove the multimeter and connect the point A to C using wire.
6. Remove the upper end of the resistor R_1 and connect the red lead to the point C and black lead to the upper end of the resistor R_1 .
7. Measure the current and record it in Table 1.
8. Remove the multimeter and reconnect resistor R_1 as it was before putting the multimeter.
9. Repeat steps 6 to 8 for resistors R_2 , R_3 , and R_4 and record the currents in the Table 1.
10. Measure voltage across points A to B and record it.
11. Switch off the power supply.
12. Do the calculations as indicated in the calculation box.

Table 1:

S/No.	Current between
1.	C and A, $I_T =$
2.	C and R_1 , $I_1 =$
3.	D and R_2 , $I_2 =$
4.	E and R_3 , $I_3 =$
5.	F and R_4 , $I_4 =$

Calculation Box
$I_{TOTAL} = I_1 + I_2 + I_3 + I_4$
$I_{TOTAL} =$

Questions:

- Is the value of I_T equal to I_{Total} , if so why?
- Write the Kirchhoff's Current Law in words.
- Which resistor has the highest current and why?