BIRZEIT UNIVERSITY

Faculty of Engineering & Technology Electrical & Computer Engineering Department

ENEE2103

CIRCUITS AND ELECTRONICS LABORATORY

PreLab 1

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Section : **2**

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Part 1 : KVL,KCL

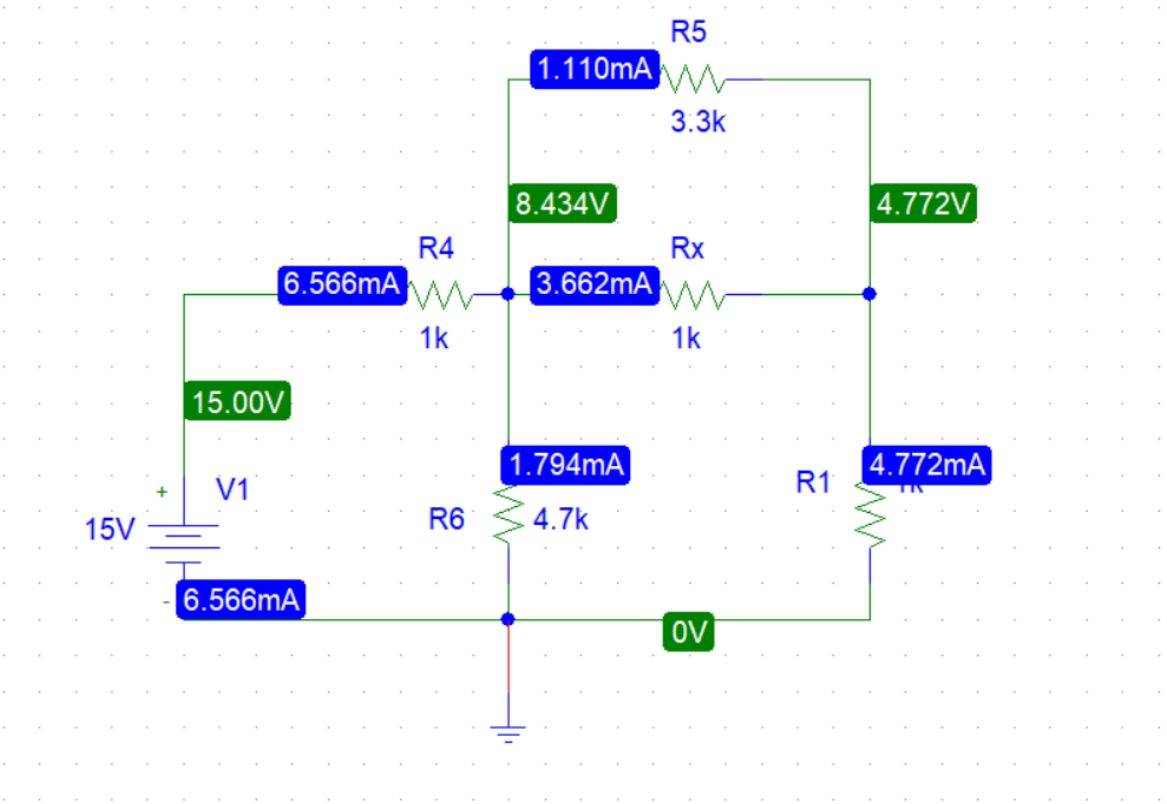

Figure 1: KCL and KVL Circuit

Vs		R1		R4		R5		R6		Rx	
		V1	I1	V4	I4	V5	I5	V6	I6	Vx	Ix
15 V	Rx = 1k	4.772 V	4.772mA	15V	6.566mA	3.662V	1.11mA	8.4318V	1.794mA	3.662V	3.662mA

Table1: KCL and KVL Circuit Values

Part 2 : Voltage and Current Division

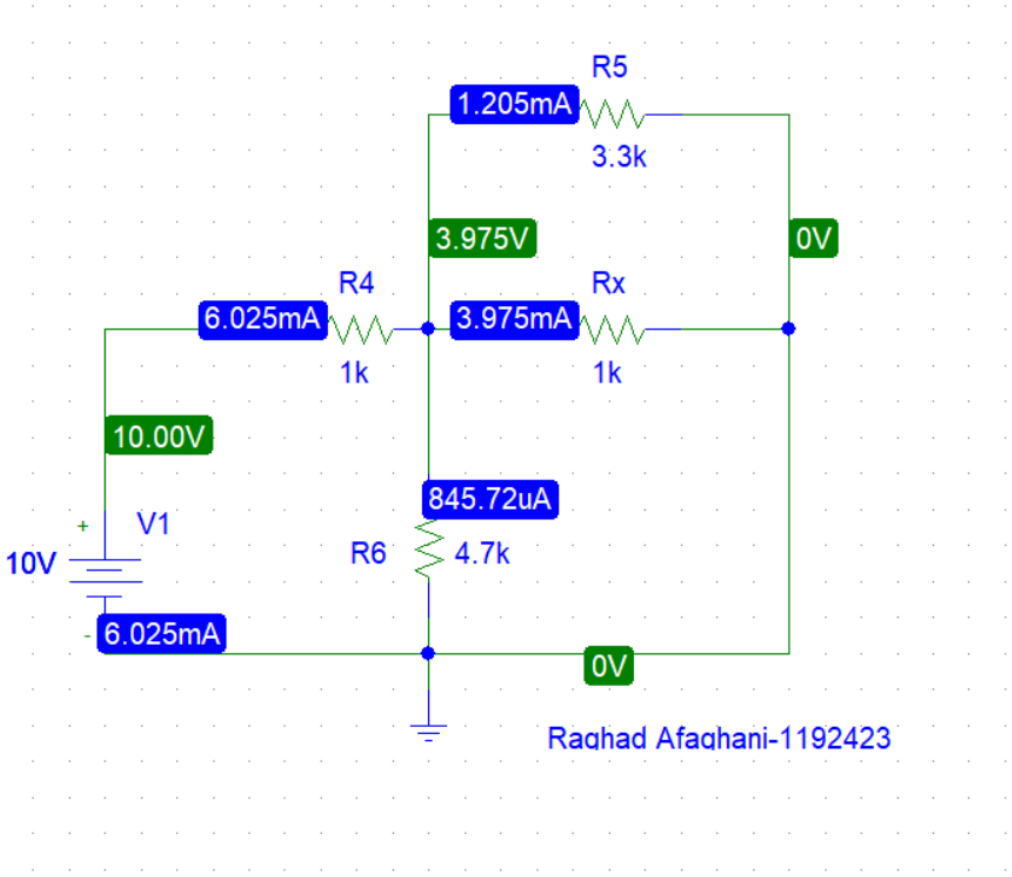

Figure 2: Current division Circuit

Vs (volt)	Pot.	I4	I5	I6	Ix
10	Rx = 1k	6.025 mA	1.205 mA	845.72 uA	3.975 mA

Table2: Current Division Circuit Values

Part 3 : Superposition

- When set the source V_{s1} to 5 volts and V_{s2} to 10 volts as shown in Figure 3:

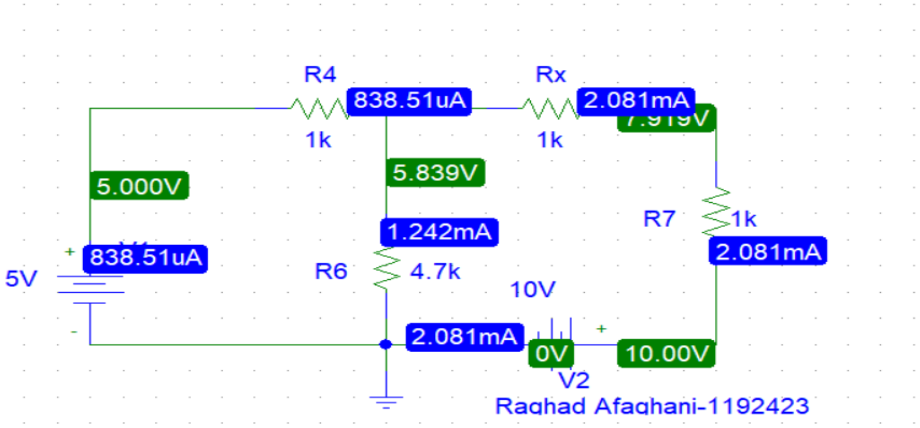

Figure 3: Vs1 = 5V and Vs2 = 10V

- When set the source V_{s1} to 0 volts and V_{s2} to 10 volts as shown in Figure 4:

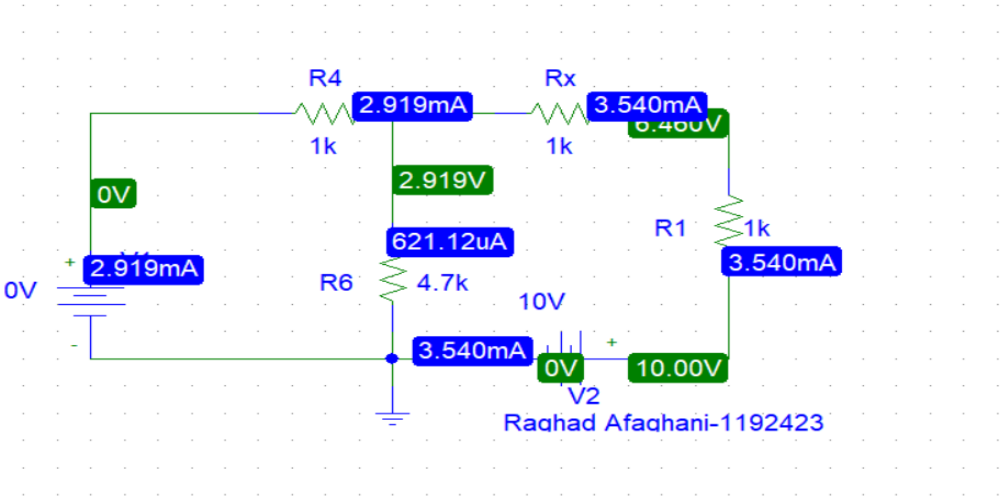

Figure 4: Vs1 = 0V and Vs2 = 10V

- When set the source V_{s1} to 5 volts and V_{s2} to 0 volts as shown in Figure 5:

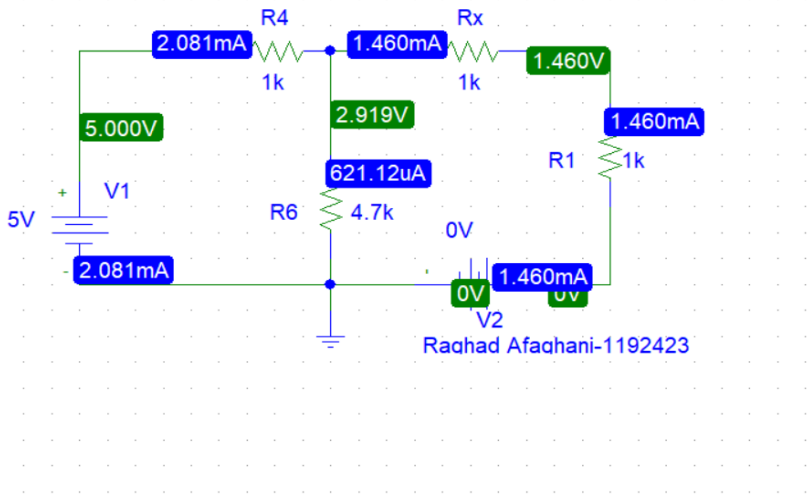

Figure 5: Vs1 = 5V and Vs2 = 0V

V_{s1}(volt)	V_{s2} (volt)	V6 (volt)	I6 (mA)
5	10	5.839 V	1.242 mA
0	10	2.919 V	621.12 uA
5	0	2.919 V	621.12 uA

Table 3: Superposition Circuit Values

Part 4 : Thevenin and Norton equivalent circuits:

1. If Vs1 is adjusted to 5 volts and Vs2 to 10 volts, with R6 set to 1K ohm, the voltage across R1 can be calculated as 7-10=-3V.

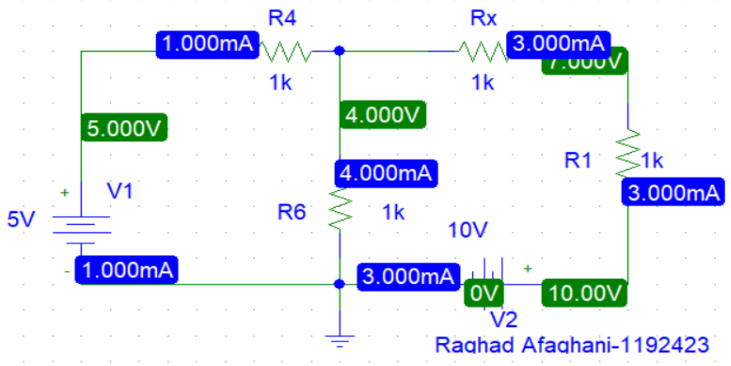

Figure 6: To find the value of voltage across R1

2. In order to find V_{oc} "open circuit voltage" = Vth: current source "IDC" was inserted between nodes a and b with a value of 0 A. As a result, Voc was calculated to be equal to Vth = 2.5 - 10 = -7.5V.

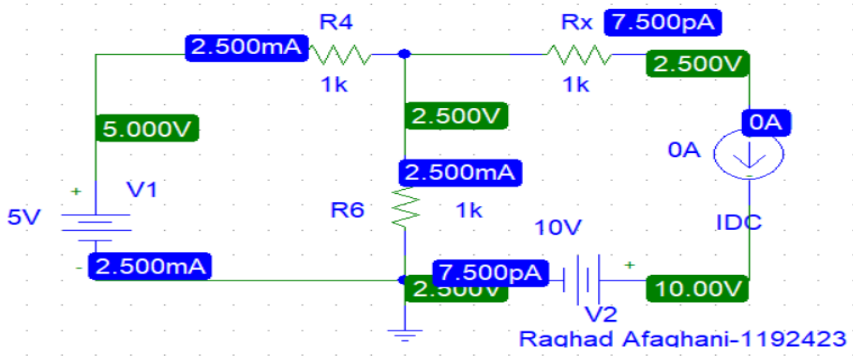

Figure 7: To find the value of open circuit voltage

3. find the current in the short circuit (I_{sc}): I_{sc} = -5 mA.(By making a short circuit between nodes a and b).

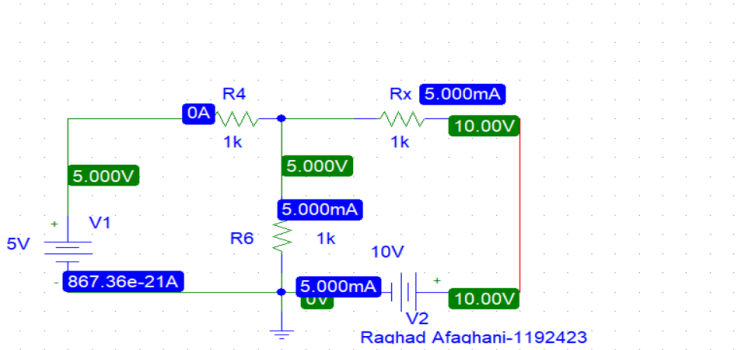

Figure 8: To find the value of Isc

4. The value of Rth, which is equivalent to R_{ab} and can be calculated as V_{th}/I_{sc} or V_{oc}/I_{norton}, is 1.5K ohm when we substitute the values of -7.5V for V_{oc} and -5mA for I_{sc}.
   Another way to obtain the value of Rth is by replaced V_{s1} and V_{s2} by short circuit and R1 with open circuit then find the equivalent register:
   - R1, R6 in parallel, then R_{eq1} = 0.5 K ohm.
   - R_{eq1}, Rx in series, then R_{eq} = R_{th} = 1.5 k ohm.

5. When connecting the voltage source in a series with the potentiometer's variable resistance(V_{R1}), and connecting the resistance R1 across the terminals a-b:

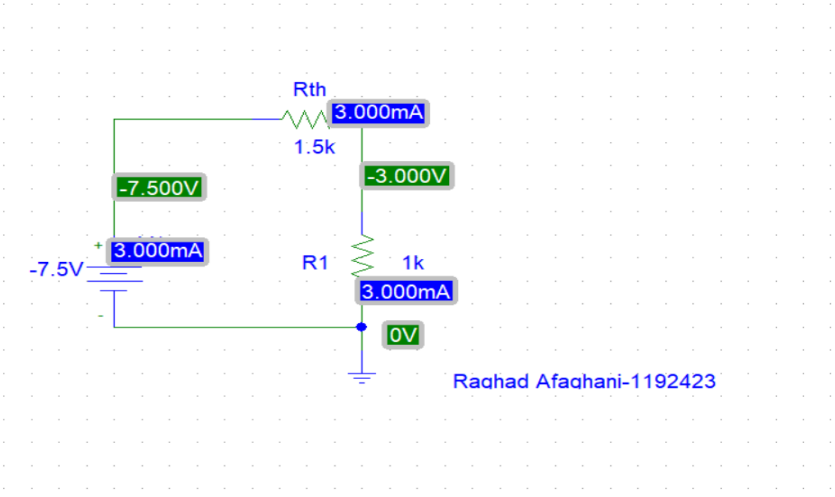

Figure 9: when connect voltage source in series with the R_{th}

6. As shown from Figure 9 , the voltage across R1, which is also equal to V_{R1}, is -3 volts (-3 - 0), this value is equal to the value measured in step 1.