CPE 1140

Circuits / DC Circuit Fundamentals Lab

Fall 2021

Laboratory Report
Lab# 3
Lab: parallel DC Circuit Analysis

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Part A:

The initial resistors, values, and tolerances are listed below they are within tolerance ranges.

Resistor labels	Resistor (Ω)	Measured (Ω)	Resistor tolerances (Ω)
R1	510	521.20	484.500 – 535.500
R2	1000	987.52	950.000 - 1050.000
R3	2000	1965.19	1900.00 – 2100.000
R_t	288.952	290.62	274.504 – 303.399

The measured parallel resistance is in tolerance range. The location of the resistors didn't matter if they were in parallel the values are approximately the same. As shown below.

Parallel labels	Parallel equivalents measured (Ω)
R_{123}	290.620Ω
R_{321}	290.630Ω

Part B:

E =5.0465 (V)
V_{R1} =5.0458(V)
V_{R2} =5.0072(V)
V_{R3} =5.0429(V)

There is nearly no difference in source voltage and voltage drop of parallel elements.

Part C:

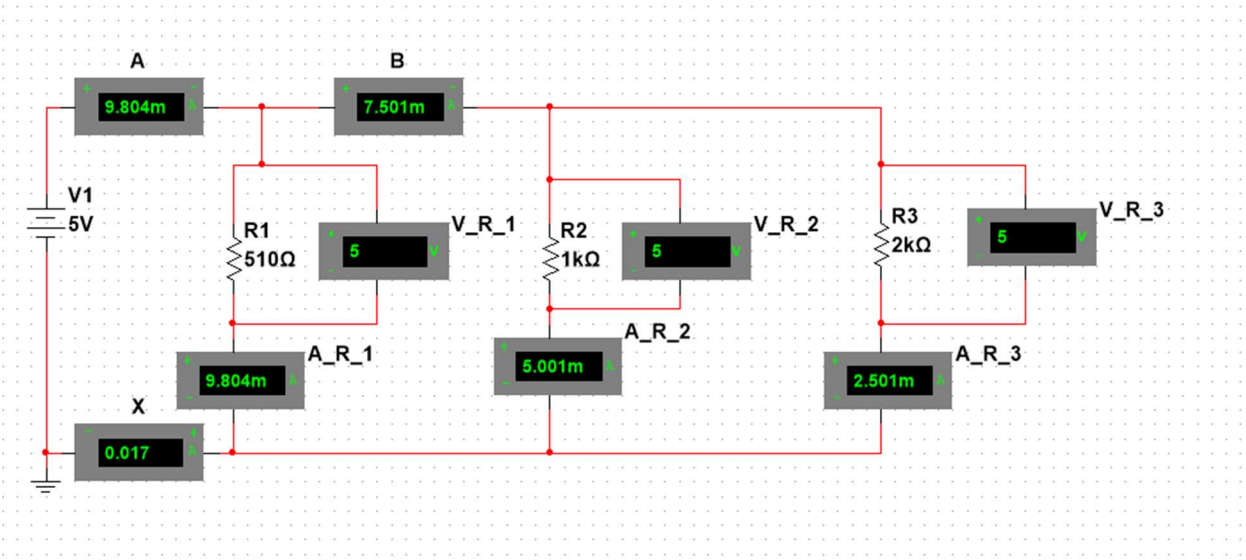
Labels	Multisim simulation values (mA)	Lab measured values (mA)
I_A	9.804	17.3191
I_B	7.501	7.6565
I_X	17.000	17.3225
I_1	9.804	9.341
I_2	5.001	5.0986
I_3	2.501	2.5330

All the values agree except for I_A. Somehow it is taking the value of the branch of R1?? I am going to use the experimental values. I also measured I_a and I_x in my home lab I cannot replicate the simulated values of I_a. In theory $I_a = I_x$ I assume this night be a software bug. I_A = 17.319 mA, I_B = 7.656 mA, I_1 = 9.341 mA. $I_B + I_1$ = 16.997 mA. All current passes though node A. The theory says they should be nearly the same and they are the measurements that day were jumpy. I_B = 7.656 mA, I_2 = 5.098 mA, I_3 = 2.533 mA. $I_2 + I_3$ = 7.631 mA. Currents I_2 and I_3 start from node B and should sum to node B. Which are nearly the same.

Resistor	Current through R (mA)	Power dissipated (mW)
R_1: 510 Ω	I_1 = 9.803	P_1 = 49.019
R_2: 1000 Ω	I_2 =5.000	P_2 =25.000
R_3: 2000 Ω	I_3 =2.500	P_3 =12.500

R_t = 288.952	Ω
I_A (R_t) = 17.303	mA
I_A (Sum) =17.303	mA

Part D:



Something is wrong about node A.