

1 Objective

The objective is to analyze a circuit and measure the real values to validate the calculated values [1].

2 Equipment Used

- Digital Multimeter
- DC Power Supply
- Resistors: 470Ω , $1K\Omega$ (2), $5.1k\Omega$, $10k\Omega$

3 Experiment Setup

Prelab to fill in the table

1. Use mesh analysis to calculate: I_A , I_B , and I_C [1].
2. Use the mesh currents to calculate the current through and voltage across each resistor [1].
3. Use the method of superposition to calculate the current through and voltage across each resistor [1].
4. Construct the circuit in a modeling software as seen in Figure 8-2 and record the results [1].

Lab to measure values

1. Construct the circuit in Figure 8-1 and record the values in the color code value on the resistors [1].

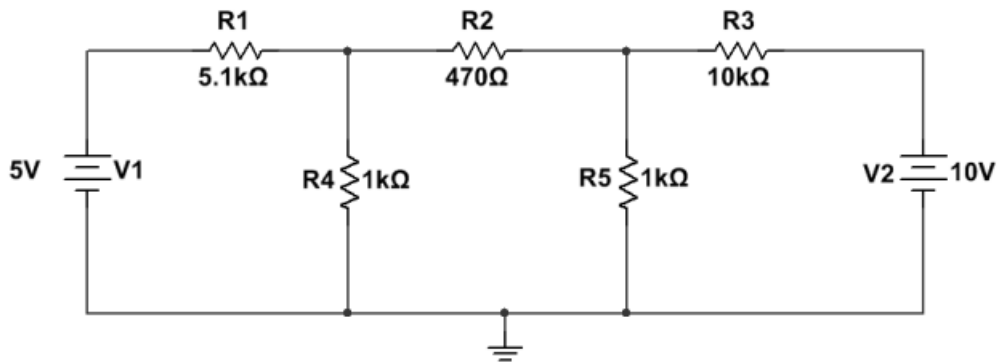


Figure 8-1: Circuit for testing [1]

2. Measure the voltage and current across and through each resistor for the values [1].
3. For the measured values of Table 8-2 use the current across R_1 , R_2 , R_3 [1].

4 Results

Table 8-1: Resistors Values [1]

Resistance	Measured ($K\Omega$)	Color Code ($K\Omega$)	Error (%)
R_1	$5.047k\Omega$	$5.1k\Omega$	1.0392 %
R_2	467.5Ω	470Ω	.5319%
R_3	$9.935k\Omega$	$10k\Omega$.65%
R_4	$.999k\Omega$	$1k\Omega$.1%
R_5	$.997k\Omega$	$1k\Omega$.3%

Table 8-2: Mesh Currents [1]

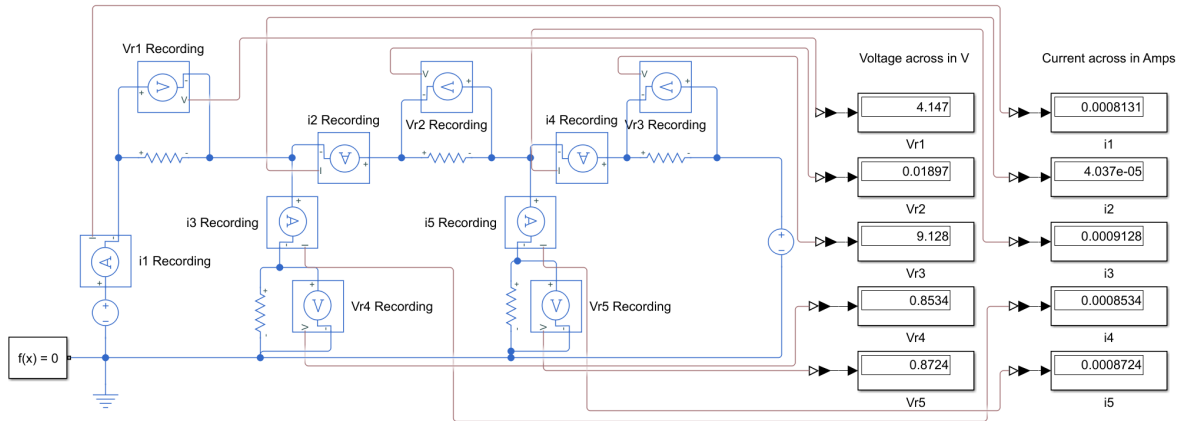
Current	Measured (mA)	Calculated (mA)	Error (%)
I_A	.806 mA	.813 mA	.861%
I_B	.043 mA	.0404 mA	5.581%
I_C	.910 mA	.913 mA	.329%

Table 8-3: Resistors Voltages [1]

	Measured	Mesh Method	Nodal Analysis	Superposition	Simulation
V_{R1}	4.14 V	4.1463 V	4.43368 V	4.1466 V	4.147 V
V_{R2}	.021 V	.018988 V	.018 V	.01897 V	.01897 V
V_{R3}	9.123 V	9.13 V	9.128 V	9.158 V	9.128 V
V_{R4} .852 V		.854 V	.853 V	.853 V	.8534 V
V_{R5}	.873 V	.8721 V	.872 V	.873 V	.8724 V

Table 8-4: Resistors Current [1]

	Measured	Mesh Method	Nodal Analysis	Superposition	Simulation
I_{R1}	.803 mA	.813 mA	.8131 mA	.81305 mA	.8131 mA
I_{R2}	.043 mA	.0406 mA	.0404 mA	.04037 mA	.04034 mA
I_{R3}	.911 mA	.913 mA	.9128 mA	.91276 mA	.9128 mA
I_{R4}	.825 mA	.8536 mA	.853 mA	.853 mA	.8534 mA
I_{R5}	.834 mA	.8271 mA	.872 mA	.873 mA	.8724 mA

**8-2: Simulated model of the circuit in Figure 8-1**

5 Conclusion

Each method of calculation will introduce error due to its assumption of ideal conditions. Furthermore, each almost all methods of calculations will give similar value but will vary in precision.

References

- [1] UNCC ECE Department. Network analysis, 2023. [Online; accessed 10 November 2023].