

**CPE 1140**

**Circuits / DC Circuit Fundamentals Lab**

**Fall 2021**

Laboratory Report

Lab# 2

Lab Series DC Circuit Analysis

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Part A:

|  |  |  |
| --- | --- | --- |
| Resistor base value Ω | Resistor tolerance ranges Ω | Resistor measured value Ω |
| R­1(470) | 446.500 - 493.500 | 466.050 |
| R­2(620) | 589.000 - 651.000 | 618.560 |
| R­3(1000) | 950.000 - 1050.000 | 992.410 |
| R­­123­(series) | 1985.500 - 2194.500 | 2077.800 |

|  |  |
| --- | --- |
| Resistor series measurements | Resistors in series values k­ |
| R­­ series predicted | 2.090 |
| R­ sum of measured | 2.077 |
| R­123 | 2.078 |
| R­321 | 2.078 |

Part A of this lab was to connect a set of resistors in a line which is known as series.

Since addition is commutative the order of summing doesn’t matter. In this case the order of the resistors still output the same resistance.

The measured results were slightly less than what is predicted but within tolerance ranges.

Part B:

|  |
| --- |
| Source E =5.046 V |
| R­123­ = 2.078 |
| Is = 2.000mA |
| I 321(A) = 2.4288 mA |
| I 123(A) = 2.4274 mA |
| I 123(B) = 2.4280 mA |
| I 123(C) = 2.4285 mA |

The objective of part b is to do a current measurement of the series circuit at different points in the series. The result was higher since the measured sum of the resistors were slightly lower than predicted. The result was higher since the measured sum of the resistors were slightly lower than predicted.

I realized I made a mistake in the lab since I inverted the direction of the measurement rather than the reversing the resistors like the instructions said I did it in my home lab. I assume the objective is to realize that the order of the resistors doesn’t effect the flow of current in a series circuit.

Part C:

Predicted values:

|  |  |
| --- | --- |
| Resistor | Voltage Drop across R (V) |
| R­1: 470 Ω | V­1 =1.124 |
| R­­2: 620 Ω | V­2 =1.483 |
| R­3: 1000 Ω | V­3 =2.392 |
| R­series­:2090­­ | V­series ­­=4.999 |

Experimental values:

|  |
| --- |
| Voltage Drop across R (V) |
| V1 =1.131 |
| V2 =1.503 |
| V3 =2.412 |
| V­total summed ­= 5.046 |
| Vtotal measured = 5.047 |
| V­source­ = 5.046 |

Since the resistors were measured to be lower than the predicted values the measured voltage drop across the resistors were also lower. The sum of the voltage drops, the measured voltage drops across all resistors, and the voltage sources was nearly identical. This experiment proved that the voltage drop can be predicted with the ratio of the ­­target resistor over the resistance of the system given it is wired in series.

Part D: Diagram, schematic

Description automatically generated

Part E:

Confict in labeling so I named the power section part E.

Table 1:

|  |  |
| --- | --- |
| Resistor | Voltage Drop across R (volt) |
| R1: 470 Ω | V1 =1.124 |
| R2: 620 Ω | V2 =1.483 |
| R3: 1000 Ω | V3 =2.392 |

|  |
| --- |
| Rt = 2090.000Ω |
| Is=2.000mA |

­ is the requested equation

Table 5:

|  |  |
| --- | --- |
| Resistor | Power dissipated (W) |
| R1 | P1 =0.001880 |
| R2 | P2 =0.002480 |
| R3 | P3 =0.004000 |

Interesting I learned that c rounds the answer if requested 3 digits. I am breaking the 3 digit rule for this objective since c programing reported R1 and R2 to have the same power consumption if I didn’t

The power consumption is well below the 0.5 watts.

Part F:

I measured the resistance of a series circuit and that the location in the series circuit didn’t matter. We measured the current at different points in a series circuit and that the current was nearly the same. I did verify the sum of the voltage drops is equal to the source voltage. The ratio of measured resistor / total resistance with the scaler of source voltage was as predicted. I