



# **MARINE INSTITUTE**

Electrotechnology 1100

Experiment 6  
Kirchhoff's Laws and Series/Parallel Circuits

## **SAMPLE CALCULATIONS:**

Using your own data, provide one worked sample of each formula used in this Lab.

## BASIC INFORMATION

Performing the calculations to solve series/parallel circuits is not easy. It is a complex process where there are many places that a learner can make errors. The only way for each individual to learn this process, is to attempt as many problems as possible. Understanding may not come easily, so it is essential that learners take calculations to their level of understanding and ask someone a question. Usually it is something very straightforward, that a demonstrator or even a fellow student can help connect the dots or achieve a lightbulb moment.

We have already had one Lab on series/parallel circuits, but this Experiment provides you with another opportunity to master series/parallel circuits.

## OBJECTIVES:

When you have completed this experiment, you should be able to:

- Apply KCL in a series/parallel circuit.
- Apply KVL in a series/parallel circuit.

## EQUIPMENT & MATERIALS REQUIRED:

Power Supply:	0-60/70V dc.
Instruments:	Analog Ohmmeter. Analog Voltmeter. Analog Milliammeter.
Resistors:	330 $\Omega$ . 470 $\Omega$ . 560 $\Omega$ . 1.2k $\Omega$ . 2.2k $\Omega$ . 3.3k $\Omega$ . 4.7k $\Omega$ .
Miscellaneous:	Orange board. 3 Black Alligator Clip to Banana Plug test leads. 3 Red Alligator Clip to Banana Plug test leads. Quick clips.

# PROCEDURE:

## PART A: Series/Parallel Circuit.

1. Using the **CODED** values of resistors, calculate the total resistance and the voltage and current of each resistor for the circuit shown in Figure 6-1 and record them in Table 6-1.

Use at least two significant figures in your calculations. Record your currents in mA.

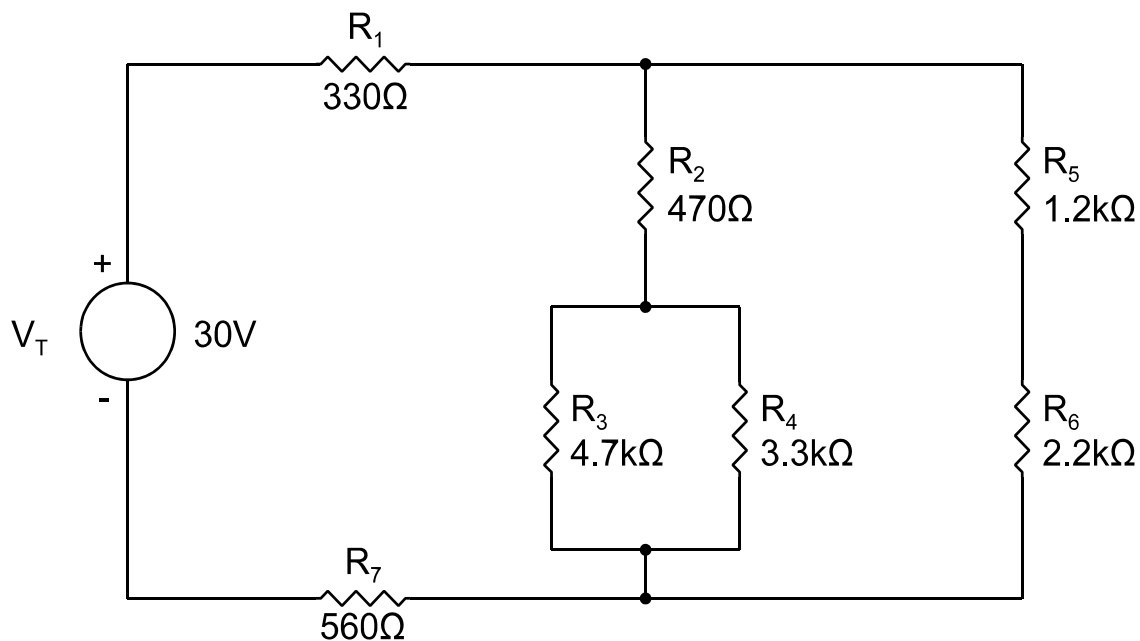


Figure 6-1

2. Measure and record in Table 6-2, the resistance of your resistors.
3. Connect the series/parallel circuit shown in Figure 6-1, but do not connect the power supply.
4. Measure and record in Table 6-2, the total resistance of the circuit.
5. Connect the power supply to the circuit.
6. Measure and record in Table 6-2, the total voltage and current and the voltage drops and current through each resistor.
7. **Have a demonstrator check your results before disconnecting the circuit.**
8. Disconnect your circuit and return all equipment to its proper place.

# RESULTS:

Table 6-1 Calculated Values

Resistor	Voltage (V)	Current (mA)	Resistance ( $\Omega$ )
Totals	30		
R <sub>1</sub>			330
R <sub>2</sub>			470
R <sub>3</sub>			4.7k
R <sub>4</sub>			3.3k
R <sub>5</sub>			1.2k
R <sub>6</sub>			2.2k
R <sub>7</sub>			560

Table 6-2 Measured Values

Resistor	Voltage (V)	Current (mA)	Resistance ( $\Omega$ )
Totals			
R <sub>1</sub>			
R <sub>2</sub>			
R <sub>3</sub>			
R <sub>4</sub>			
R <sub>5</sub>			
R <sub>6</sub>			
R <sub>7</sub>			

## QUESTIONS:

1. Compare  $I_T$  to the sum of  $I_2$  and  $I_5$ . Does this satisfy KCL? Explain.

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2. Compare  $V_T$  to the sum of  $V_1$ ,  $V_2$ ,  $V_3$  and  $V_7$ . Does this satisfy KVL? Explain.

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3. State two other KVL loops which include  $V_T$ .

*Hint: A path for current must satisfy KVL.*

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As preparation for next week's lab, you can complete  
Tables 7-1, 7-3 and 7-4 in Experiment 7 (p64-65).

See Step A1 (p60), Step B1 (p61) and Step C1 (p62).