

## Laboratory 5

# Superposition

(Round your calculation and simulation results to 2 decimal places if necessary)

## Objectives

- Study and verify the principle of superposition.

## Equipment and components

- A computer/laptop
- Matlab software

## Preliminary

1. Read section 4.13 of the textbook.
2. Calculate the theoretical results related to this lab and fill in Table 1, 2, and 3.

## Procedure

1. Open Matlab and create a Simulink model of the circuit shown below. Measure the voltage across the  $10\ \Omega$  resistor.
2. Fill in your simulation results in Table 1.

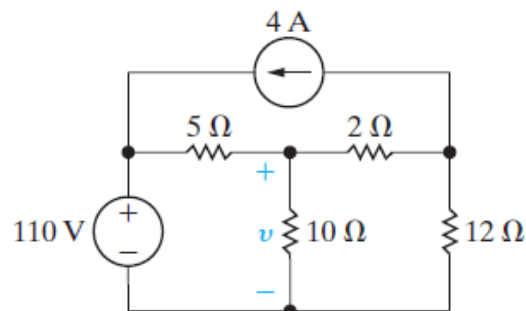


Table 1

	Theoretical Results (V)	Simulation Results (V)
Both sources are in place		
110 V voltage source is in place		

4 A current source is in place		
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**What can you conclude given the above results?**

3. Add a diode in the circuit as shown below and create a Simulink model in Matlab. Measure the voltage across the diode and 10  $\Omega$  resistor.
4. Fill in the simulation results in Table 2.

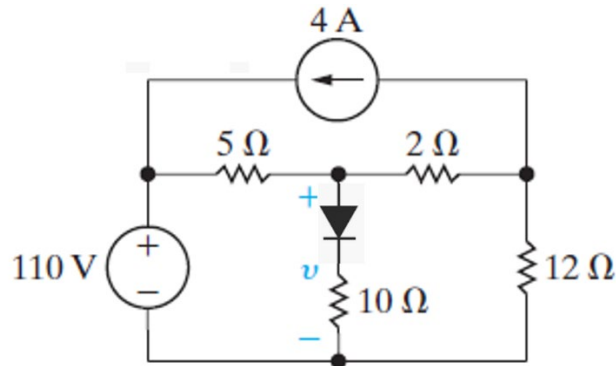


Table 2

	Simulation Results (V)
Both sources are in place	
110 V voltage source is in place	
4 A current source is in place	

**What do you observe? Is the sum of voltages in Row 2 and 3 equal to the voltage in Row 1? Does the superposition principle still hold for this circuit? Please research diodes and explain why.**

5. Create a Simulink model for the following circuit. Learn how to add dependent sources in the Simulink model. Measure the voltage across the 20 k $\Omega$  resistor.
6. Fill in your simulation results in Table 3.

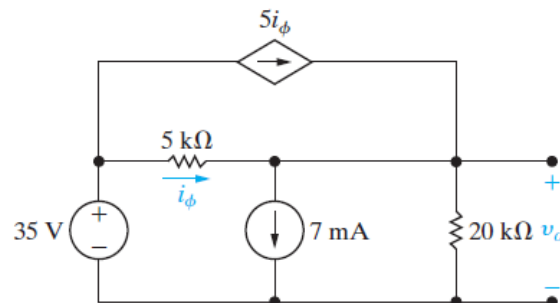


Table 3

	Theoretical Results (v)	Simulation Results (v)
Both sources are in place		
35 V voltage source is in place		
7 mA current source is in place		

**What can you conclude given the above results?**

## Questions and conclusions

- Summarize your findings and explanations in response to the questions posed in this lab.