ENGR 065 Circuit Theory

Laboratory 4

Thévenin Equivalent Circuits

Objectives

- Understand Thévenin equivalents

Equipment and components

- A computer
- Matlab software

Preliminary

1. Read section 4.10, 4.11, 4.12, and 4.13 of the textbook.
2. Compute the theoretical calculations related to this lab and fill in Table 1

Procedure

1. The purpose of this lab is to find the Thévenin equivalent for the following circuit (Problem 4.64 in Assignment 3) by using different ways.
2. Open Matlab and create Simulink model of the circuit shown below by following the procedure in Lab 1
3. Fill up your simulation results in Table 1.

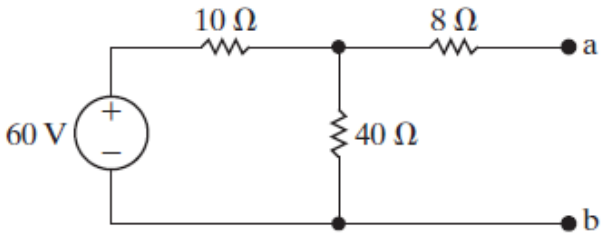


Table 1 Thevenin Equivalent Circuit

	Calculation Results	Simulation Results
V_{Th}		
R_{Th}		

Are the simulation results consistent with your calculation results?

4. Remove the 60 V voltage source and then add a test voltage source across the terminals **a** and **b** in the above circuit. Create the Simulink model of the following circuit.
5. Try the different values of the test source, measure the I_{test} and fill it up in Table 2
6. Calculate R_{Th} by using $R_{Th} = \frac{V_{test}}{I_{test}}$

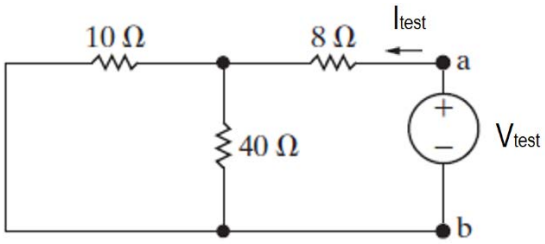


Table 2 Test Voltage Source and Thevenin Resistance

V_{test}	1 V	5 V	10 V	100 V
I_{test}				
R_{Th}				

What is your conclusion for the results?

7. Short the terminals ***a*** and ***b***. Create the Simulink model of the following circuit.
8. Measure the current i_{sc} and fill up the simulation in Table 3

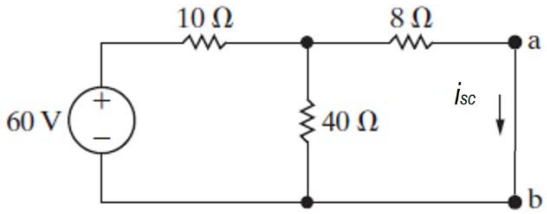
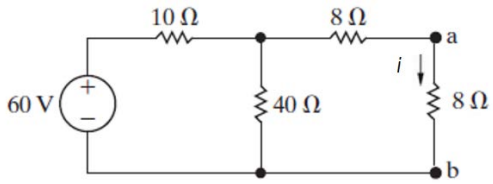


Table 3 Short Circuit Current and Thevenin Resistance

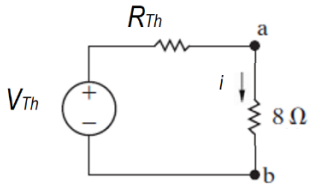
I_{sc}	
V_{Th} (from Table 1)	
R_{Th}	

What is your conclusion of the result?

9. Add a 8 Ω resistor to the circuit as shown in the circuit below and create a Simulink model find current in the resistor.



10. Add the 8 Ω resistor to the Thevenin equivalent circuit you found in Steps 1, 2, and 3 as shown in the circuit below and calculate the current i.



Are the two currents in Step 9 and Step 10 same? What is your conclusion about your findings?

Questions and conclusions

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