<center>Laboratory 3</center>

Series and Parallel Circuits and Node Voltages

Objectives
- Analyze series and parallel circuits
- Study and verify the node-voltage method
- KVL verification for a more complicated circuit

Equipment and components

- A computer
- Matlab software

Preliminary

1. Refer to Chapters 3 and 4 of the textbook if necessary.
2. Complete the theoretical calculations before attending the lab.

Procedure

1. Open Matlab.
2. Create a Simulink model of the circuit as shown below by following the procedures in Lab 1.
3. Measure the currents in the resistors and fill in your simulation results in Table 1. Please note that I_{R_x} refers to the current flowing through R_x.
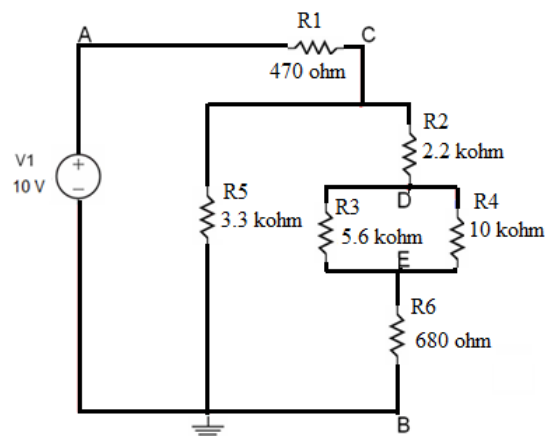
Table 1 Currents Flowing Through Resistors

	Theoretical Results	Simulation Results
I_{R1}		
I_{R2}		
I_{R3}		
I_{R4}		
I_{R5}		
I_{R6}		

What can you observe from Table 1? Explain.

4. Measure the node voltages at each node as shown in the circuit above and fill in your simulation results in Table 2. Please note that V$_X$ refers to the voltage across the point X and the ground (reference node).

Table 2 Node Voltages at Each Node

	Theoretical Results	Simulation Results
V_A		
V_B		
V_C		
V_D		
V_E		

➤ What can you observe from Table 2? Explain.
➤ If R_1 is removed from the circuit, what would be the value of V_D? Explain.
➤ If R_6 is removed from the circuit, what would be the value of V_D? Explain.
➤ If R_5 is removed from the circuit, would the current in R_1 increase or decrease?

5. Create the Simulink model of the circuit as shown below to verify KVL.
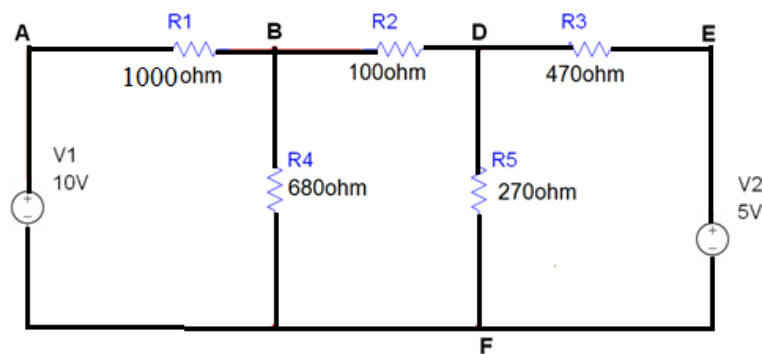
6. Fill in the simulation results and check each closed loop (hint: 6 in total) to show that the KVL holds true in each closed loop.

Table 3 Voltages across Each Resistor

Symbol	Theoretical Results	Simulation Results
V_{AB}		
V_{BD}		
V_{DE}		
V_{EF}		
V_{AF}		
V_{BF}		
V_{DF}		

What can you observe from Table 3? Explain.

Questions and conclusions

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