S. Y. B. Tech. (Electrical and Computer Engineering)

Semester: IV **Subject: Electrical Circuit Analysis**

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Roll No: 33 **Batch:** A2

Experiment No: 03

Name of the Experiment: Verification of Kirchhoff's Current Law and Kirchhoff's Voltage law using MATLAB Simulink.

Performed on: 23/8/2022

Submitted on: 13/9/2022

Marks	Teacher's Signature with Date
	13-9-22

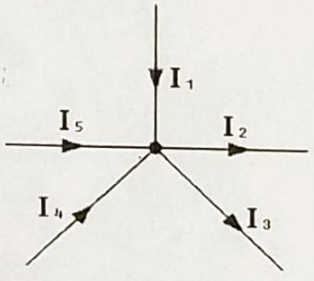
Aim: Verification of Kirchhoff's Current Law and Kirchhoff's Voltage law using MATLAB Simulink.

Prerequisite: Knowledge of basic electrical engineering.

Theory:

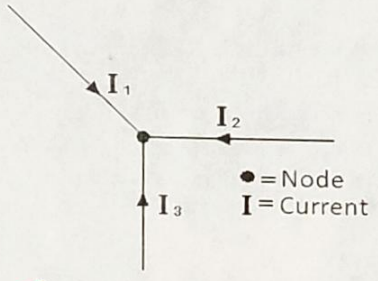
Kirchhoff's circuit laws lie at the heart of circuit analysis. With the help of these laws and the equation for individual components (resistor, capacitor and inductor), we have the basic tool to start analysing circuits.

Kirchhoff's Current Law: It states that, the total current entering a junction or a node is equal to the charge leaving the node as no charge is lost.



$I_1-I_2-I_3+I_4+I_5=0$

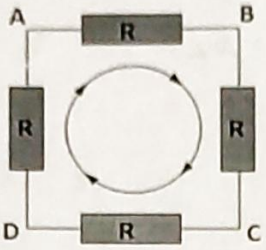
(a)



$I_1+I_2+I_3=0$

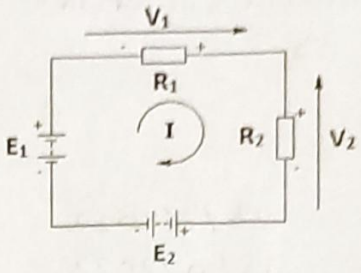
(b)

Kirchhoff's Voltage Law: It states that, the voltage around a loop equals the sum of every voltage drop in the same loop for any closed network and equals zero.



$V_{AB} + V_{BC} + V_{CD} + V_{DA} = 0$

(a)



$E_1 + V_1 - V_2 - E_2 = 0$

$E_1 + V_1 = V_2 + E_2$

(b)

Procedure:

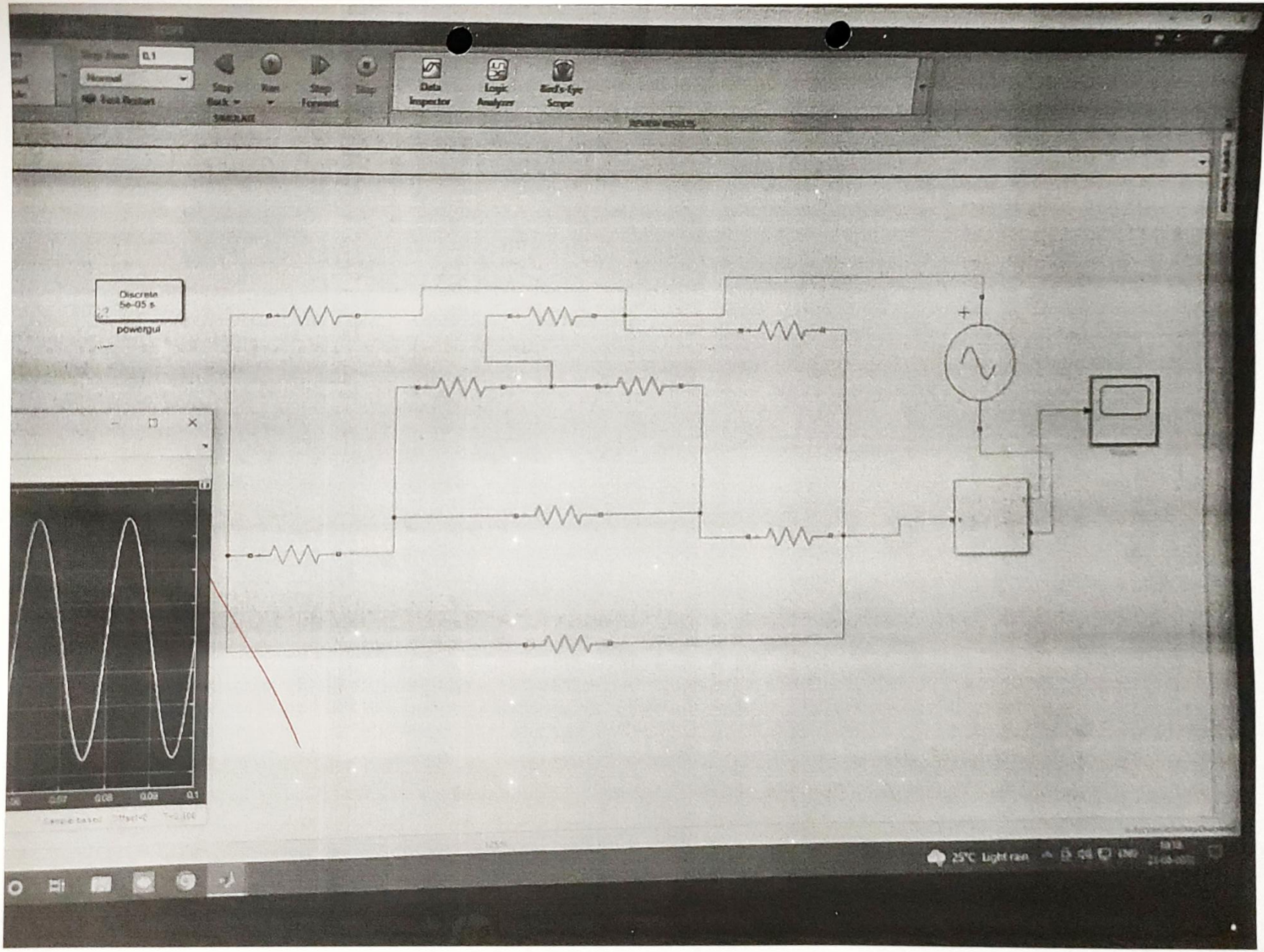
1. Open MATLAB
2. Open Simulink
3. Open blank model
4. Create a model with more than one resistances with series and parallel connections
5. Prove KCL by measuring currents entering and leaving the node
6. Prove KVL by measuring voltage drops across all resistances in the circuit

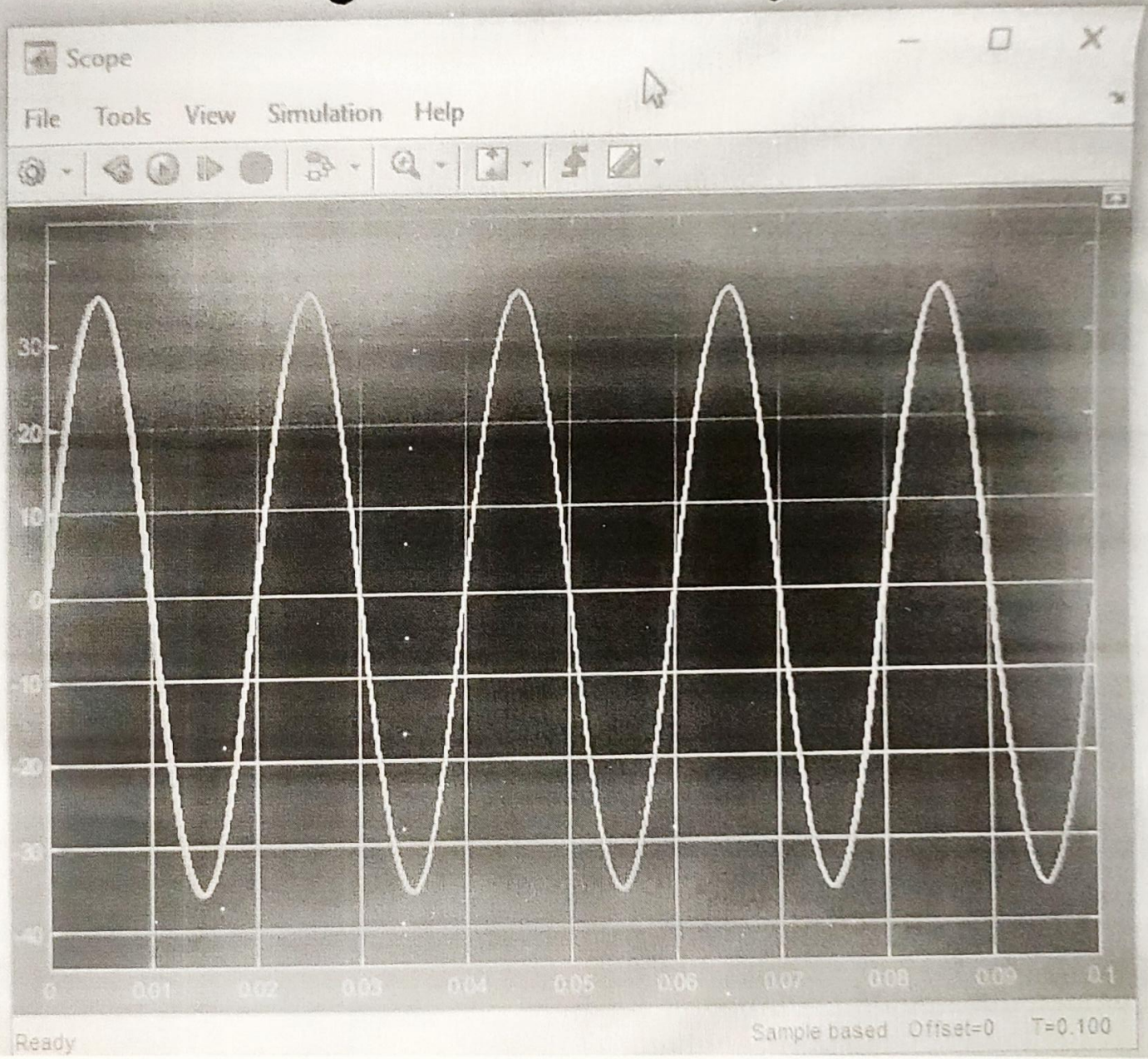
Activity:

Attach screenshots of above activity.

Post Lab Questions:

1. What is current divider rule?
2. What is meant by dependent and independent voltage sources?
3. What does it mean by passive circuit elements?


Discrete
5e-05 s
powergui
Data Inspector
Logic Analyzer
Bird's-Eye Scope
25°C Light rain


Scope
File Tools View Simulation Help
30
20
10
0
-10
-20
-30
-40
0 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.1
Ready
Sample based Offset=0 T=0.100

* Post Lab Questions -

Q 1) What is current divider rule?

→ The Current Divider Rule allows us to calculate the current flowing through each parallel resistive branch as a percentage of the total current.

Q 2) What is meant by dependent and independent voltage sources?

→ • Independent sources are those sources, whose output value doesn't depend upon the circuit parameters like voltage and current.

• Dependent sources are the sources where output value depends upon the voltage or current at some other part of circuit.

Q 3) What does it mean by passive circuit elements?

→ A passive element is an electrical component that does not generate power, but instead dissipates, stores, and/or releases it. Passive elements include resistances, capacitors & coils.

13-9-22