AMRITA VISHWA VIDYAPEETHAM

(University Established U/S 3 of the UGC Act 1956)

AMRITA SCHOOL OF ENGINEERING, BENGALURU

श्रद्धावान् लभते ज्ञानम्

Lab Report

Academic Year2025- Jan -May

Department of Electrical and Electronics Engineering

Name : **SAMYUKTHA HEMENDRA**
Register No : **BL.SC.U4AIE24142**
Semester : **2nd Sem AIE D/E/F Section**
Course Title : **Introduction to Electrical and Electronics Engineering**
Course Code: **22AIE114**

CONTENTS:

Experiment No. 1 **Date**

VERIFICATION OF KIRCHOFF'S LAWS FOR D.C CIRCUITS USING MATLB SIMULINK Platform

Aim:

To verify Kirchhoff's laws for D.C circuits.

Statement:

a) Kirchoff's current law (KCL): The sum of currents at any node is zero.

OR

At any node, the sum of the incoming currents is equal to the sum of the outgoing currents

b) Kirchoff's Voltage law (KVL): The Algebraic sum of applied voltage and the voltage drops is zero in any closed circuit

OR

In any closed circuit, the sum of the applied voltages is equal to sum of the voltage drops.

Components Required:

DC voltage source, Voltage Measurement, Current Measurement, Series RLC Branch, Display, Powergui (continuous), Scope (for graph)

Procedure:

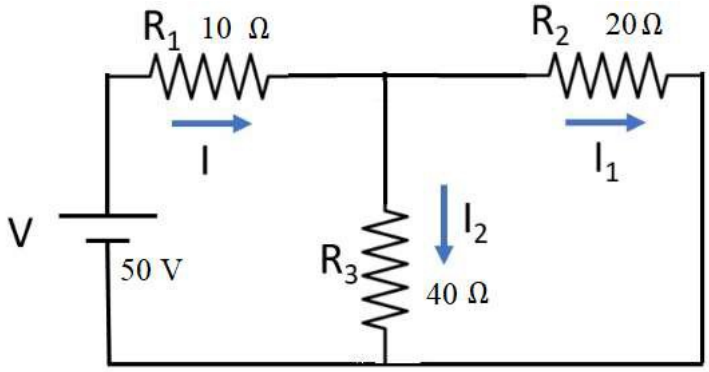
(a) Kirchhoff's Current Law (KCL) :-

1. Assume the current flowing through each resistor as I, I1, I2.
2. Assume the direction of current flowing through each branch (resistor).
3. Measure the current flowing into the top node of the circuit from each of the three branch.
4. To measure the current, you should break the circuit to insert the ammeter.
5. You must also measure the polarity of current. If the current flows into the node, then current should be measured from the positive terminal to the negative terminal only.
6. Record the measured currents.
7. Add the current to check if the sum of the currents is zero.

(b) Kirchhoff's Voltage Law (KVL) :-

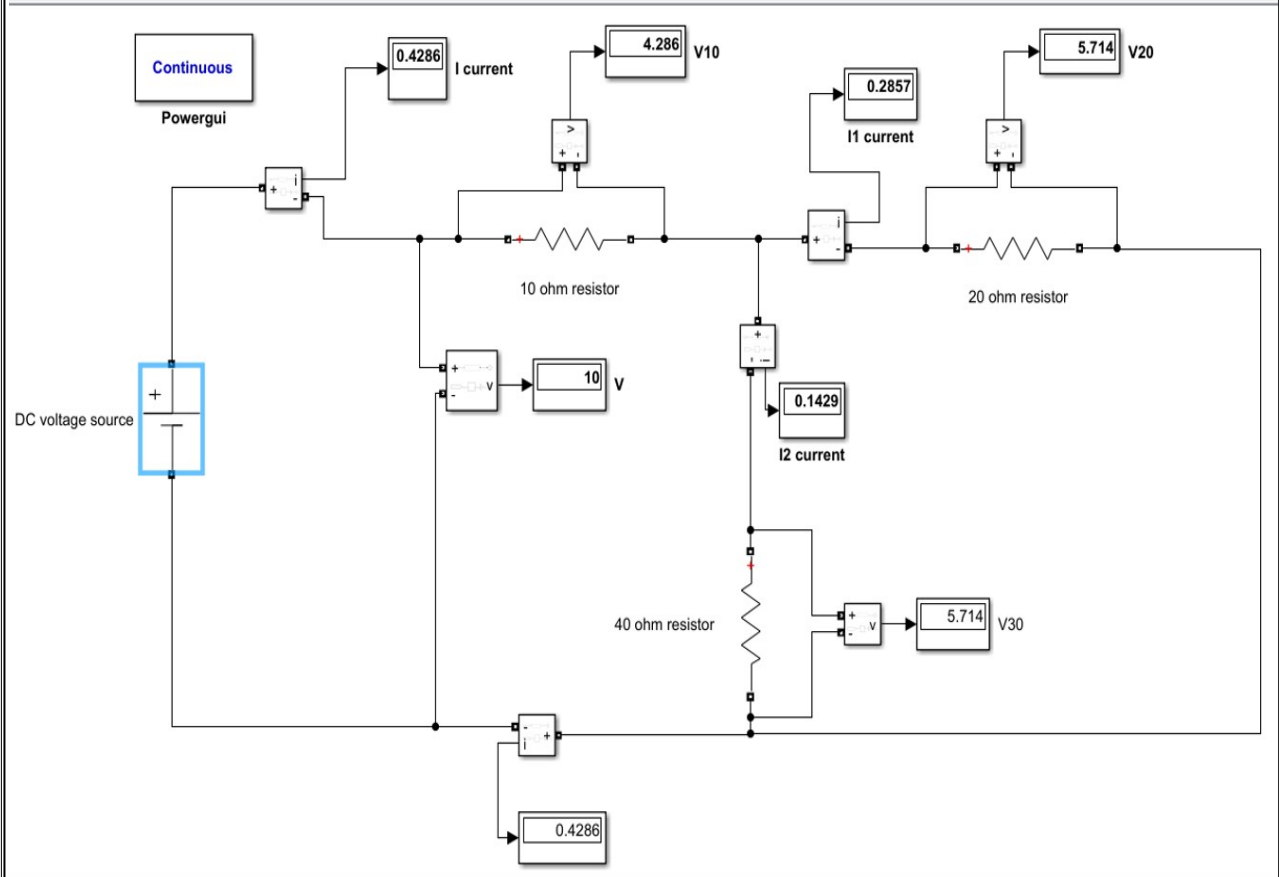
1. Connect the circuit as per the circuit diagram.
2. Switch on the power supply by connecting it to "powergui" simulates the circuit.
3. Measure V_{10}, V_{20}, V_{40}.
4. Apply KVL for every loop and verify the result.

Circuit Diagram:

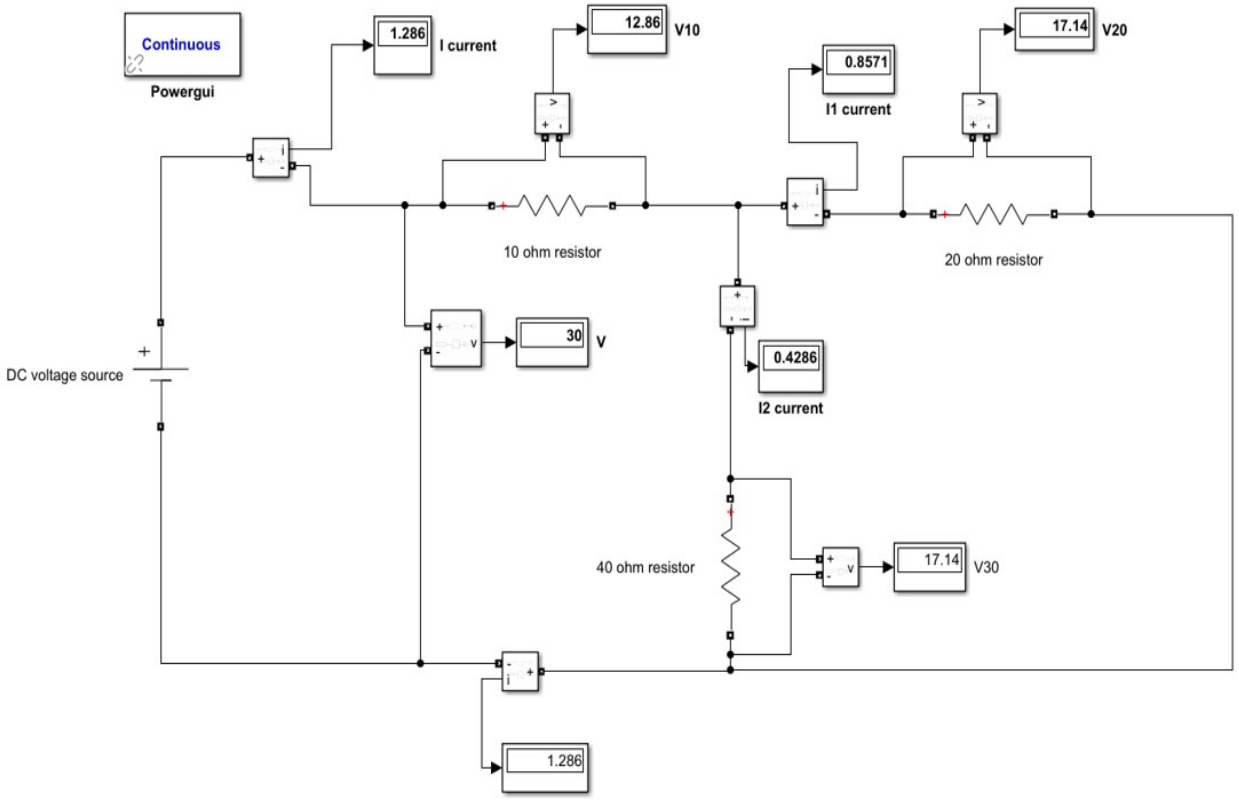


Simulation Diagram:

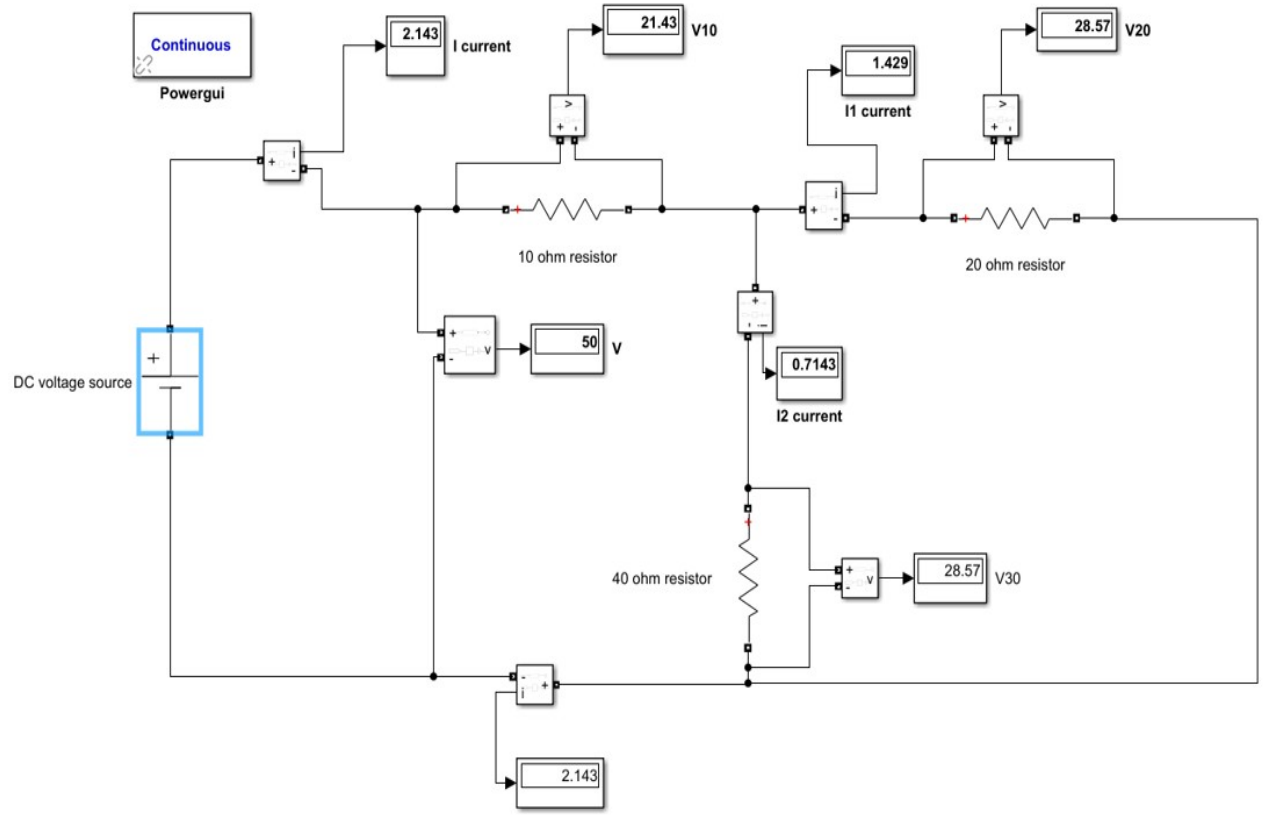
1.



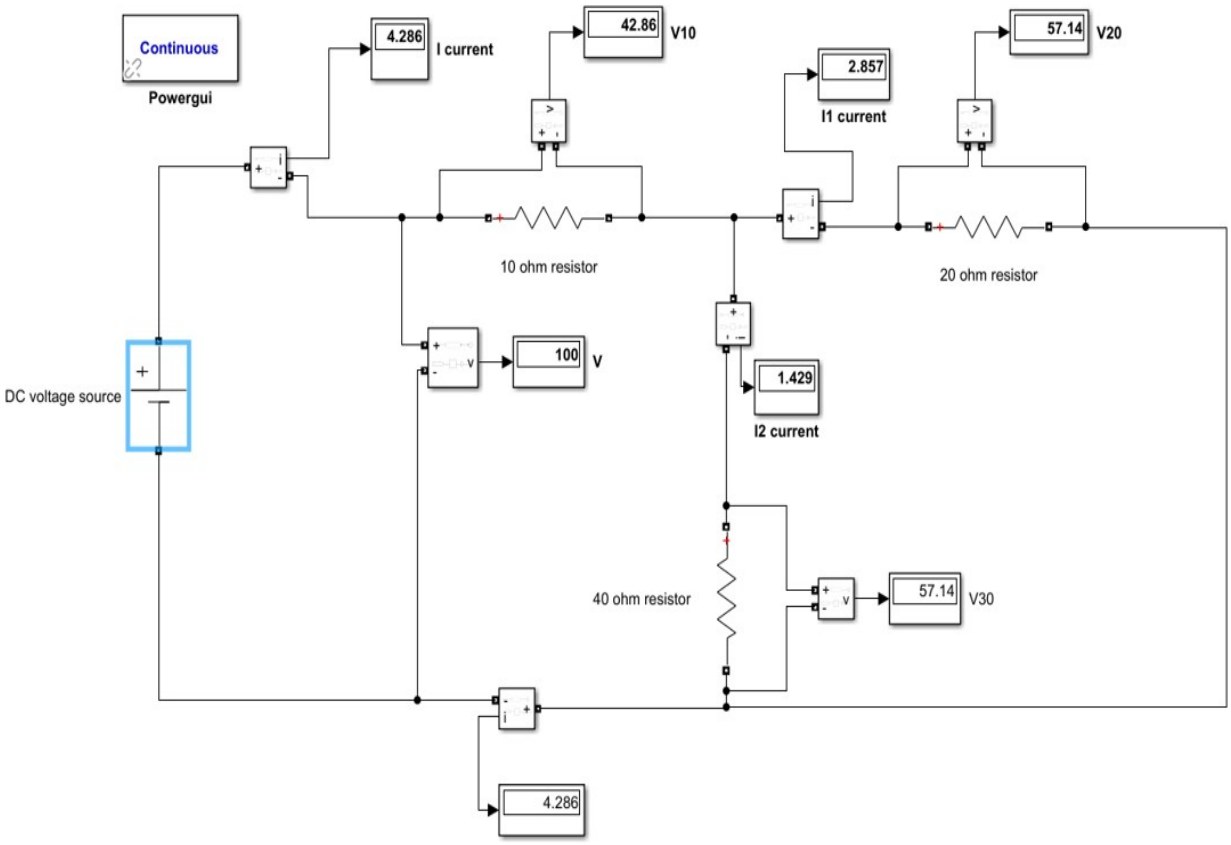
2.


Continuous
Powergui
1.286
I current
12.86
V10
0.8571
I1 current
17.14
V20
10 ohm resistor
20 ohm resistor
DC voltage source
30
V
0.4286
I2 current
40 ohm resistor
17.14
V30
1.286

3.


Continuous
Powergui
2.143
I current
21.43
V10
1.429
I1 current
28.57
V20
10 ohm resistor
20 ohm resistor
DC voltage source
50
V
0.7143
I2 current
40 ohm resistor
28.57
V30
2.143

4.



Observation Table:

(a) Kirchhoff's Current Law :-

V	I		I1		I2	
	Theory	Practical	Theory	Practical	Theory	Practical
10	0.4286 A	0.4286 A	0.2857 A	0.2857 A	0.1429 A	0.1429 A
30	1.286 A	1.286 A	0.8571 A	0.8571 A	0.4286 A	0.4286 A
50	2.143 A	2.143 A	1.429 A	1.429 A	0.7143 A	0.7143 A
100	4.286 A	4.286 A	2.857 A	2.857 A	1.429 A	1.429 A

(b) Kirchhoff's Voltage Law :-

V	V1		V2		V3	
	Theory	Practical	Theory	Practical	Theory	Practical
10	4.286 v	4.286 v	5.714 v	5.714 v	5.714 v	5.714 v
30	12.86 v	12.86 v	17.14 v	17.14 v	17.14 v	17.14 v
50	21.43 v	21.43 v	28.57 v	28.57 v	28.57 v	28.57 v
100	42.86 v	42.86 v	57.14 v	57.14 v	57.14 v	57.14 v

Results:

1. The current through 10 Ω resistor for test case 1 = 0.4286 A
   The voltage across 10 Ω resistor for test case 1 = 4.286 v
   The current through 20 Ω resistor for test case 1 = 0.2857 A
   The voltage across 20 Ω resistor for test case 1 = 5.714 v
   The current through 40 Ω resistor for test case 1 = 0.1429 A
   The voltage across 40 Ω resistor for test case 1 = 5.714 v

2. The current through 10 Ω resistor for test case 2 = 1.286 A
   The voltage across 10 Ω resistor for test case 2 = 12.86 v
   The current through 20 Ω resistor for test case 2 = 0.8571 A
   The voltage across 20 Ω resistor for test case 2 = 17.14 v
   The current through 40 Ω resistor for test case 2 = 0.4286 A
   The voltage across 40 Ω resistor for test case 2 = 17.14 v

3. The current through 10 Ω resistor for test case 3 = 2.143 A
   The voltage across 10 Ω resistor for test case 3 = 21.43 v
   The current through 20 Ω resistor for test case 3 = 1.429 A
   The voltage across 20 Ω resistor for test case 3 = 28.57 v
   The current through 40 Ω resistor for test case 3 = 0.7143 A
   The voltage across 40 Ω resistor for test case 3 = 28.57 v

4. The current through 10 Ω resistor for test case 4 = 4.286A
   The voltage across 10 Ω resistor for test case 4 = 42.86v
   The current through 20 Ω resistor for test case 4 = 2.857 A
   The voltage across 20 Ω resistor for test case 4 = 57.14v
   The current through 40 Ω resistor for test case 4 = 1.429 A
   The voltage across 40 Ω resistor for test case 4 = 5.714 v

Inference:

At a node, sum of incoming current is equal to the outgoing currents. Hence verified KCL.
In a closed circuit, the algebraic voltage drop is zero. Hence verified KVL.