

Experiment Title- 2

Student Name: RAJDEEP JAISWAL

Branch: 26 B

Semester: 2nd

Subject Name: BEEE LAB

UID: 20BCS2761

Section/Group: 26 B

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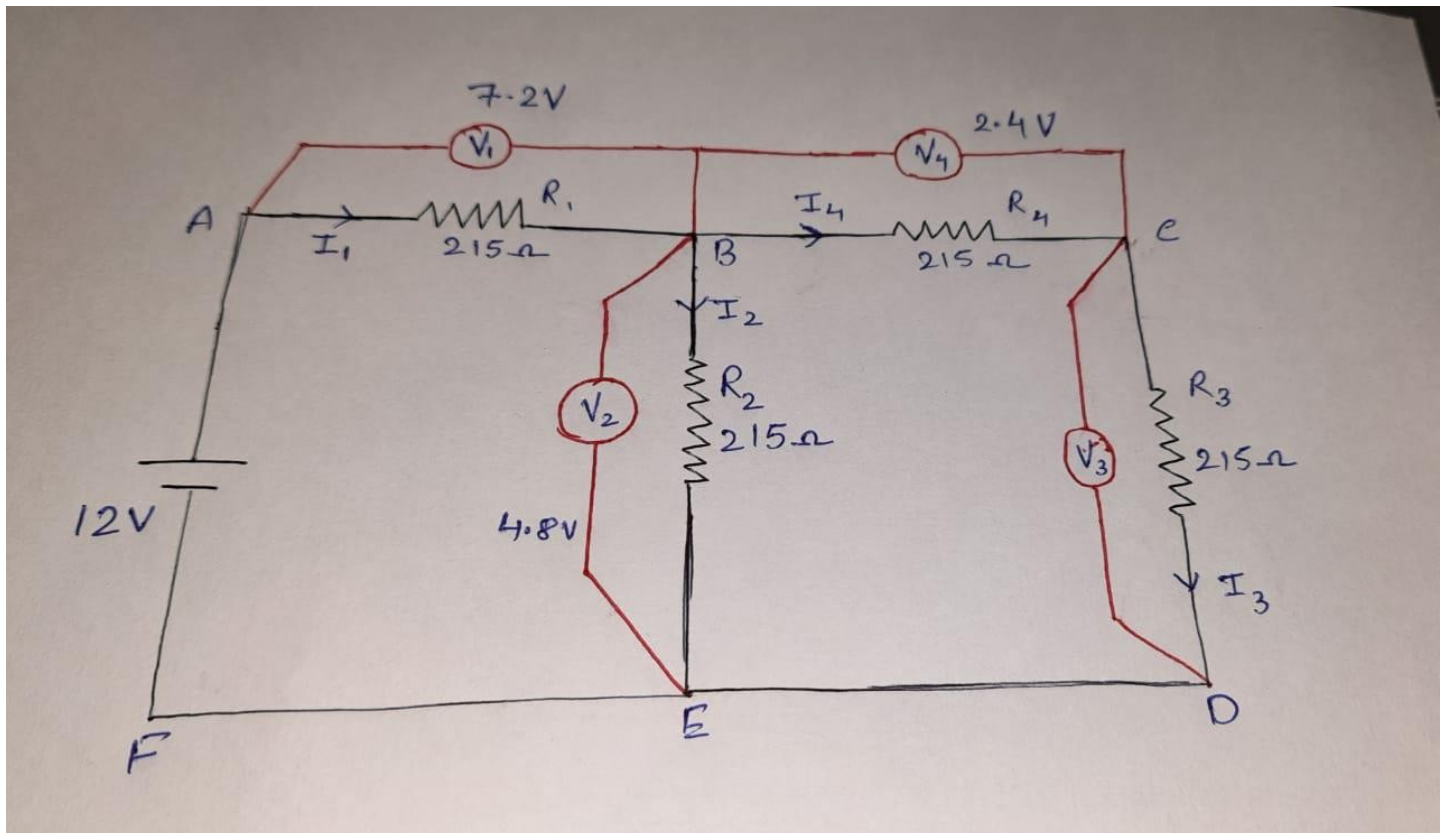
Subject Code: : 20ELP 152

1. **Aim:** To verify Kirchhoff's Voltage Law (KVL) and study its limitations.

2. **Apparatus:**

S. No.	Equipment Name	Specifications and Ratings	Quantity in numbers
1.	Regulated variable DC supply	0-30 V 0-2 A	1
2.	Digital Multimeter	0-30 V	4
3.	Resistors	215 Ω	4
4.	Connecting wires	As per requirement

3. Circuit Diagram:



4. Steps for experiment:

1. The circuit is connected as shown in the above.
2. The voltage of DC supply was set at 12 V DC supply.
3. Same values of R_1 to R_4 were taken and readings of V_1 to V_4 were noted down.
4. Accordingly, only one set of readings was taken at 12 V DC supply.
5. The observations were recorded in table.

5. Theory

Kirchhoff's laws are used to determine the current and voltage in different branches of an electric circuit which may not be easily solved by Ohm's law. These laws are applicable to both AC and DC circuits.

Statement of Kirchhoff's Second Law or Kirchhoff's Voltage Law (KVL) or Mesh Law:

In any closed path (mesh or loop) of an electric circuit, the algebraic sum of the product of current and resistance in each of the conductors plus the algebraic sum of electromotive forces (EMFs) in that closed path is zero.

$$\sum IR + \sum \text{emf} = 0$$

Where IR = Potential drop across the resistor emf =
Potential of battery used in the circuit

Σ = Algebraic sum

6. Calculations/Theorems /Formulas used etc

* Applying KVL in loop AB EF,

$$V = I_1 R_1 + I_2 R_2$$

or $V = V_1 + V_2$

$$V = 7.2 + 4.8$$

$$= 12V$$

* Applying KVL in loop BCDE,

$$V_2 = I_4 R_4 + I_3 R_3 \text{ or}$$

$$V_2 = V_4 + V_3$$

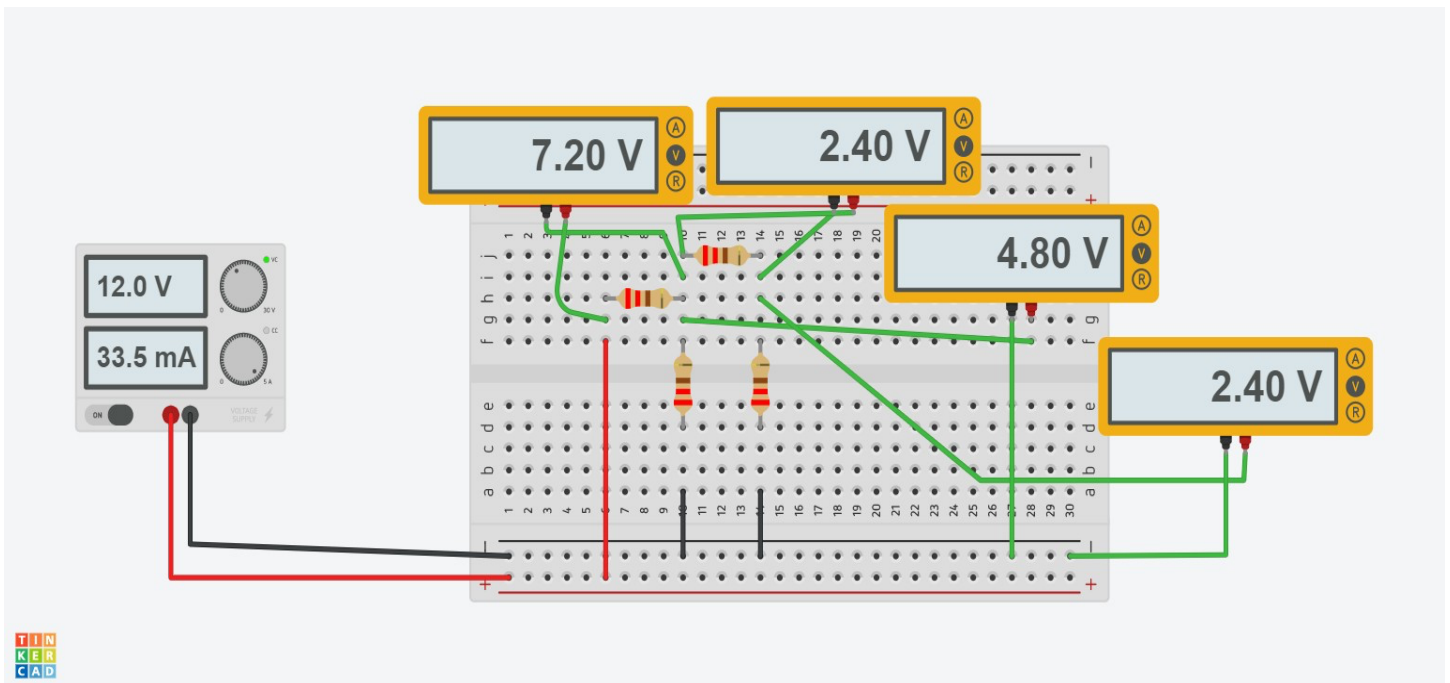
$$V_2 = 2.4 + 2.4$$

$$= 4.8V$$

7. Observations/Discussions:

S. No.	Supply Voltage (V)	Voltmeter V ₁ (V)	Voltmeter V ₂ (V)	Voltmeter V ₃ (V)	Voltmeter V ₄ (V)
1.	12	7.2	4.8	2.4	2.4

8. Online Simulation:



9. Precautions:

1. Switch off the supply first and then start making connections.
2. Meters of the suitable range should be used as shown above.

Learning outcomes (What I have learnt):

1. Applicable on both AC and DC circuit.
2. KVL Law is used to determine current and voltage in different branches of an electric current.
3. It is also called as Mesh Law.
4. KVL is verified for linear.

Evaluation Grid:

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.	Worksheet completion including writing learning objectives/Outcomes.(To be submitted at the end of the day).		10
2.	Post Lab Quiz Result.		5
3.	Student Engagement in Simulation/Demonstration/Performance and Controls/Pre-Lab Questions.		5
	Signature of Faculty (with Date):	Total Marks Obtained:	