

Experiment Title.: -1

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Name: Alasso

Branch:

Semester:

Subject: BEEE

UID: 21BCS2124

Section:

Subject Code:



Aim: To verify Kirchhoff's Current Law (KCL) and study its limitations.

Apparatus:

S. No.	Equipment Name	Specifications and ratings	Quantity in nos.
1	Regulated variable DC supply	0 – 30 V, 0 – 2 A	1
2	Digital multimeter	0-30 V	6
3	Resistors	Of different values	6
4	Connecting wires	As per requirement	

Circuit Diagram:

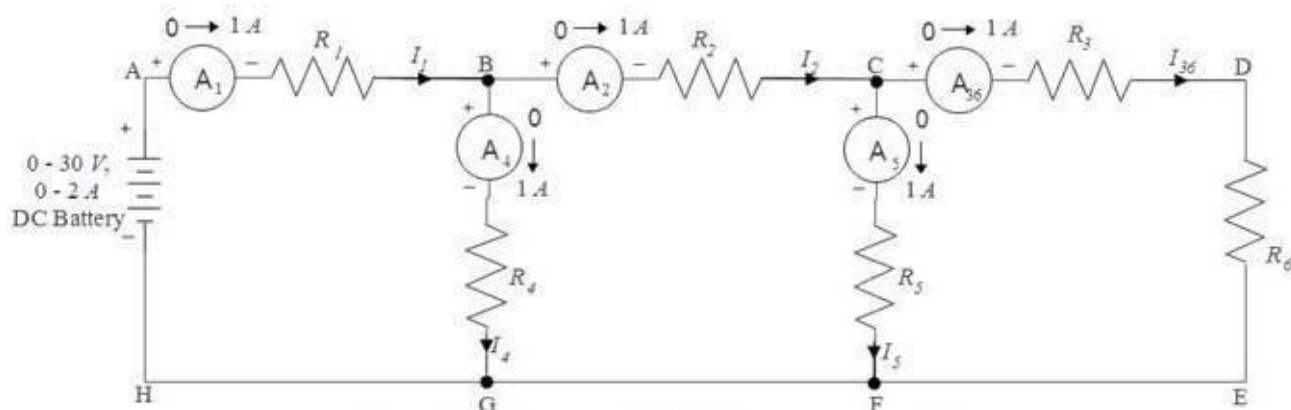


Fig 2: Circuit Diagram of Kirchhoff's Current Law

Steps for Experiment:

1. Took 1 battery of 9 volts, 6 multimeters of 0-30 volts, 6 resistors of any value and few meters of connecting wires
2. Then we will need to connect them in the manner as shown above in the circuit diagram.
3. Different values of R_1 to R_6 were taken and readings of A_1 to A_6 were noted down.
4. All 6-multimeter showed different current values.
5. we then calculated their theoretical values and compared it with the values shown on the multimeter.
6. By this comparison we came to know the errors in our experiment.
7. Dividing the error then theoretical values we came to know the error perfect.



Calculations/Theorems /Formulas used

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 First Law or Kirchhoff's Current Law (KCL) or Point Law:

It states that the algebraic sum of all the currents entering into a junction or a node in any electric circuit at any instant is zero.

Explanation:

Kirchhoff's Current Law. Kirchhoff's Current Law (KCL) is Kirchhoff's first law that deals with the conservation of charge entering and leaving a junction. The current law states that for a parallel path the total current entering a circuit's junction is exactly equal to the total current leaving the same junction.

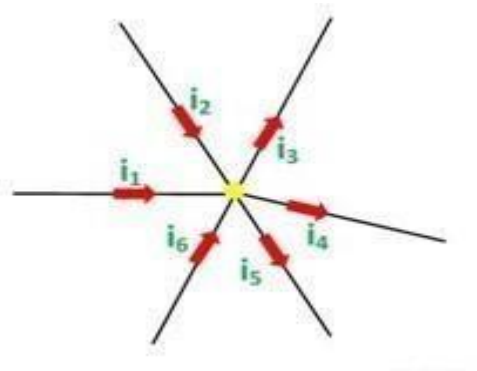


Fig 1:

Explanation of KCL From above diagram can such as:

$$i_1 + i_2 + i_6 = i_3 + i_4 + i_5$$

Calculations and Formulae:

Applying KCL junction B:

$$I_1 = I_2 + I_4 \quad (2)$$

Applying KVL junction C:

$$I_2 = I_3 + I_5 \quad (3)$$

Calculations are done for all the readings being taken using Equations (2) and (3) to be applied at respective junctions.

FORMULAE:

$$\text{ERROR} = \frac{\text{THEORETICAL VALUE} - \text{CALCULATED VALUE}}{\text{THEORETICAL VALUE}} \times 100\%$$

$$\text{Since, } I_1 = I_2 + I_4 \quad (1)$$

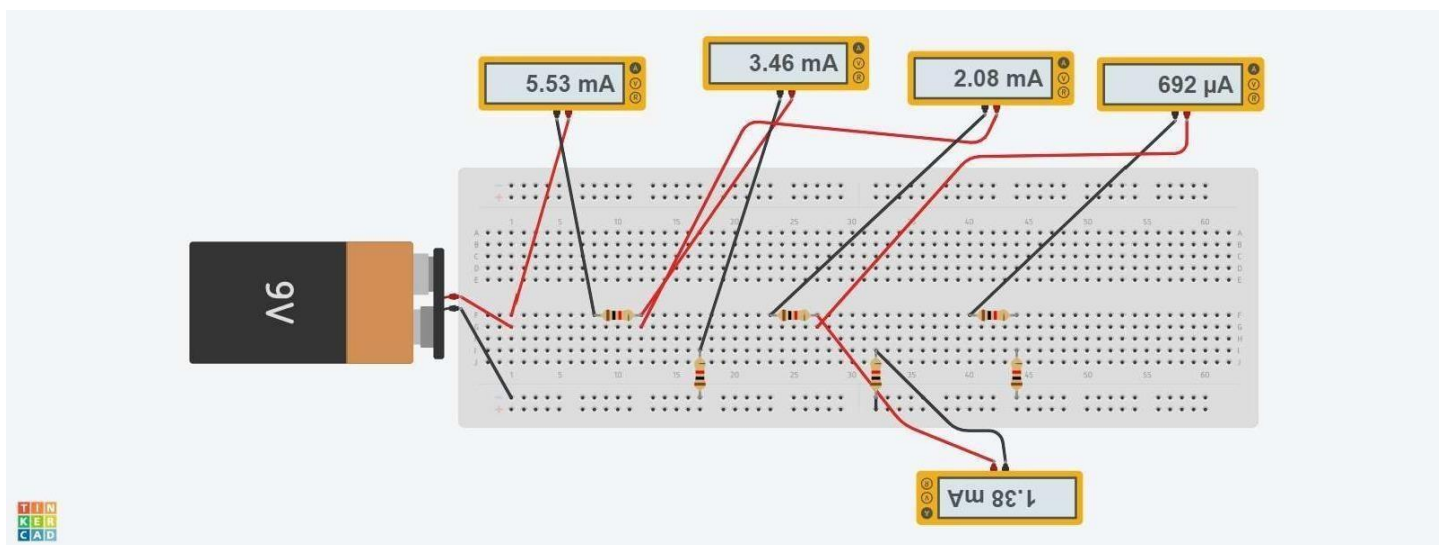
$$I_2 = I_3 + I_5 \quad (2) \text{ THEREFORE, } I_1 = (2.08 + 3.46) \text{mA}$$

$$= 5.54 \text{mA} \quad \text{-THEORETICAL VALUE BUT ACCORDING TO EXPERIMENT, } I_2 = 2.08 \text{mA}$$

$$\text{THEREFORE, ERROR}(I_2) = -0.008 \text{mA}$$

Observations/Discussions:

Sl no.	Supply Voltage Vcd(V)	AmmeterI1 (A)	AmmeterI2 (A)	AmmeterI3 (A)	AmmeterI4 (A)	AmmeterI5(A)
1.	9V	5.53mA	2.08mA	0.692mA	3.46mA	1.38mA



Percentage error (if any or applicable):

ERROR PERCENT = ERROR/THEORETICAL VALUE * 100% THEREFORE,

PERCENTAGE ERROR (I1) = $0.01/15.54 * 100\%$

= 0.18%

ERROR PERCENT = ERROR/THEORETICAL VALUE * 100% SIMILARLY,

PERCENTAGE ERROR (I2) = $-0.008/2.072 * 100\%$

= -0.38%



Sl no.	Calculated values of current (A)			Theoretical values of current(A)			Percent error		
	I1=I2+I4 (A)	I2=I3+I5 (A)		I1=I2+I4 (A)	I2=I3+I5 (A)		I1% ERROR	I2% ERROR	
1.	5.53mA	2.08mA		5.54mA	2.072mA		0.18% -0	.38%	

Result output:

Graphs (If Any):

Image/Soft copy of graph paper to be attached here:

NO GRAPH AVAILABLE



Learning outcomes.

1. Learnt to measure the resistance and current.
2. Learnt about KCL law in details.
2. Learnt to design circuit in series or parallel connection.
3. Learnt to verify KCL law.

Evaluation Grid:

Sr. No.	Parameters	Marks Obtained	Max 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 obtain	