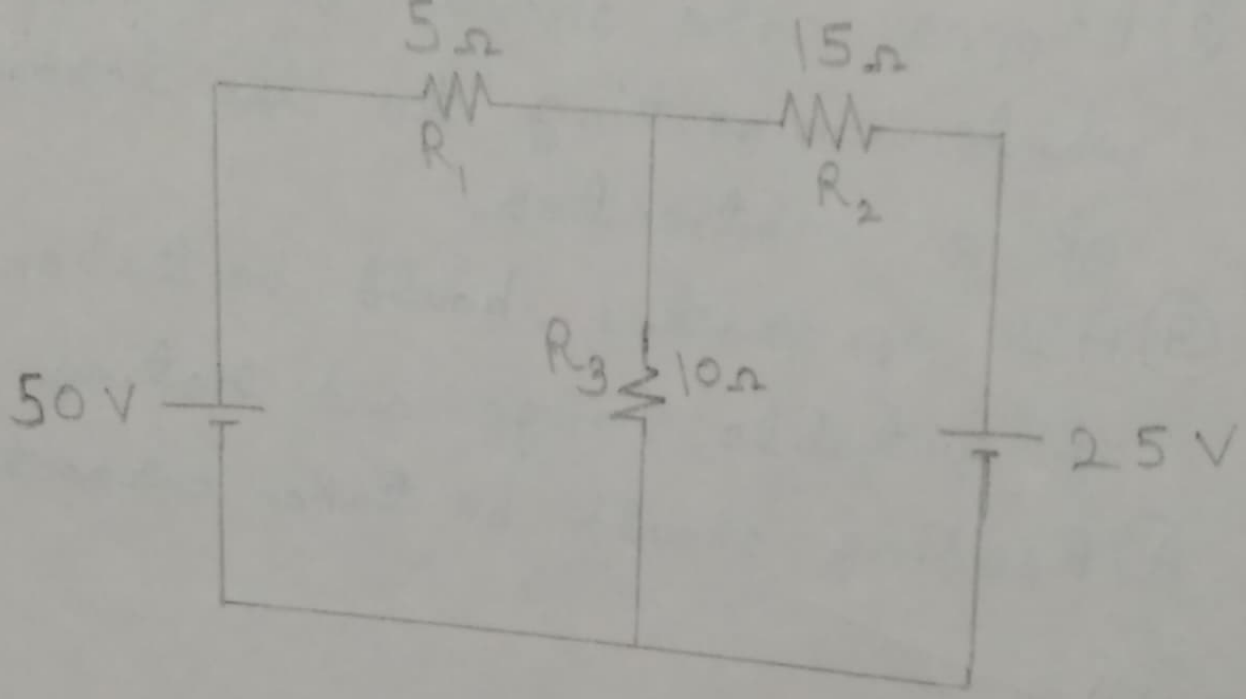
Circuit Diagram:-



Experiment No.-3

Object :- Verification of Kirchoff's Law.

Apparatus :-

• A.C. Supply	0-30 V	1
• Ammeter	0-2 A	3
• Voltmeter	0-150 V	1
• Rheostat	20 Ω	3

Theory :-

Kirchoff's Voltage Law (KVL) :- In a closed circuit the algebraic sum of voltage is zero. If V is the supply voltage, I is the current flowing through elements of resistance R_1, R_2, R_3.

$$V - I(R_1 + R_2 + R_3) = 0$$

Kirchoff's Current Law (KCL) :- At any junction the current entering the junction is equal to current going out to the junction.

$$I = I_1 + I_2$$

Observation Table :-

KVL :-

S.No	Supply Voltage (V)	V_1 (V)	V_2 (V)	V_3 (V)	Result
1	50 V	18.18 V	0 V	31.82 V	50 V
2	25 V	0 V	-6.82 V	31.82 V	25 V

KCL :-

S.No	V_{source} (V)	I_1	I_2	I_3
1	50	-4.54	2.72	1.82
2	75	-6.82	4.09	2.73
3	100	-9.09	5.45	3.64

KVL Reading :-

S.No	$V_{Source1}$ (V)	$V_{Source2}$ (V)	V_1 (V)	V_2 (V)	V_3 (V)
1	15 V	25 V	2.27	12.27	12.73
2	15 V	0 V	6.82	8.18	8.18

Formula used :-

$$\Delta V_{Loop} = 0$$

$$\Sigma I = 0$$

Calculation :-

Verification of KVL :-

In loop 1,

$$-15 + V_1 + V_3 = 0$$

$$-15 + 2.27 + 12.73 = 0$$

$\because$ L.H.S. = R.H.S.

In loop 2,

$$25 - V_3 - V_2 = 0$$

$$25 - 12.73 - 12.27 = 0$$

$\because$ L.H.S = R.H.S

$\therefore \Delta V_{Loop} = 0$

Verification of KCL :-

$$\Sigma I = 0$$

$$I_1 + I_2 + I_3 = 0$$

$$-4.54 + 2.72 + 1.82 = 0$$

$\because$ L.H.S. = R.H.S.

$\therefore \Sigma I = 0$

Hence Verified.

Result :- By observing the calculation its verified that sum of potential in a closed loop is equal to 0 and sum of current entering and going out from the junction is equal to 0.

Precautions :-

1. All the connections should be tight.
2. All devices should be checked they are working properly or not before connecting to the circuit.
3. Voltmeter is always connected in parallel with the resistor
4. Ammeter is always connected in series with the resistor.

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