

VERIFICATION OF KICHOFF'S VOLTAGE LAW AND KICHOFF'S CURRENT LAW

AIM:

To verify Kichhoff's voltage law for loop's and Kichhoff's current law for loop's followings current.

APPARATUS REQUIRED:

LAPTOP with Proteus Software.

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THEORY:

According to Kichhoff's voltage law:

Sum of Potential raises are equal to equal to sum of Potential drops in a loop.

In Loop I By KVL:

$$V = V_1 + V_2 + V_3 \rightarrow ①$$

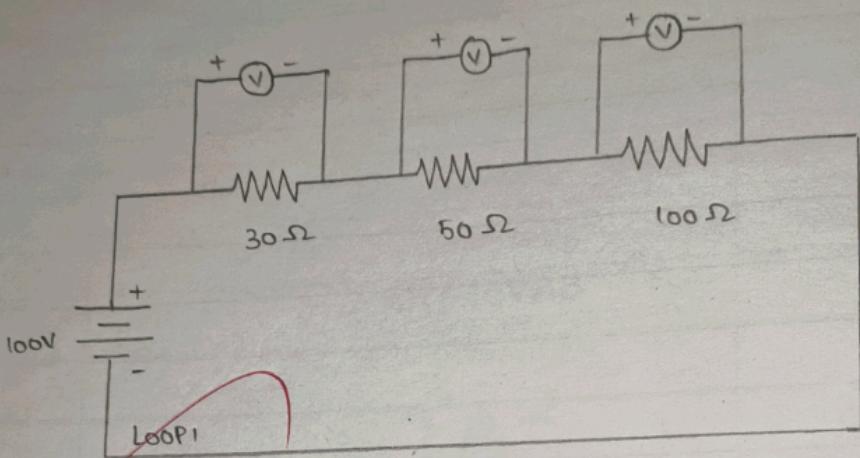
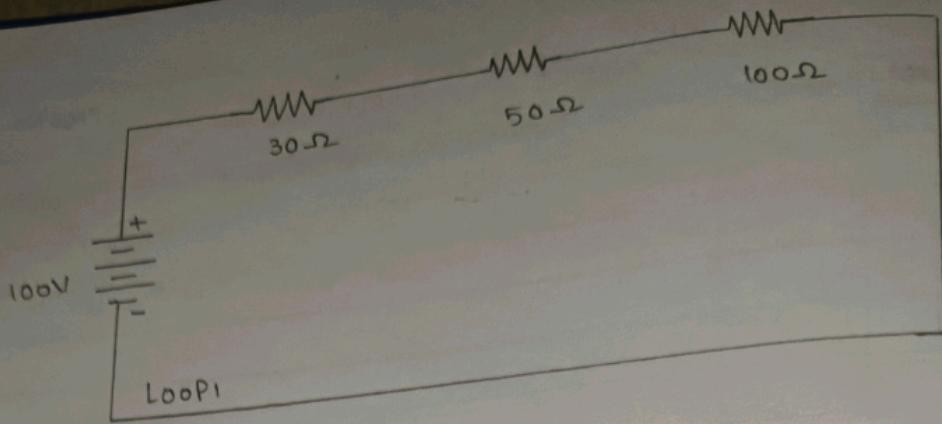
$$100 = IR_1 + IR_2 + IR_3$$

$$R_{\text{eq}} = R_1 + R_2 + R_3$$

$$V_{\text{Req}} = 180 \Omega$$

$$I = \frac{V}{R_{\text{eq}}} = \frac{100}{180}$$

$$I = 0.556 A$$



TABULATION:

KVL	SOURCE (v)	$V_{30\Omega}$ (v)	$V_{50\Omega}$	$V_{100\Omega}$	$V_{30\Omega} + V_{50\Omega} + V_{100\Omega}$ (v)
Theoretical	100	16.68V	27.8V	55.6V	100.05

$$V_1 = V_{30\Omega} = IR_1 = 0.556 \times 30 = 16.68 \text{ V}$$

$$V_2 = V_{50\Omega} = IR_2 = 0.556 \times 50 = 27.8 \text{ V}$$

$$V_3 = V_{100\Omega} = IR_3 = 0.556 \times 100 = 55.6 \text{ V}$$

Substitute V_1 , V_2 and V_3 value in ①

$$100 = 16.68 + 27.8 + 55.6 = 100 \text{ V} = 100 \text{ V}$$

Hence Proved

Kirchoff's current law:

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In a junction, Incomes current is equal to outgoings current.

At node A:

$$I_{30\Omega} + I_{50\Omega} + I_{100\Omega} = 0$$

$$V = 100/30 + V/50 + V/100 = 0$$

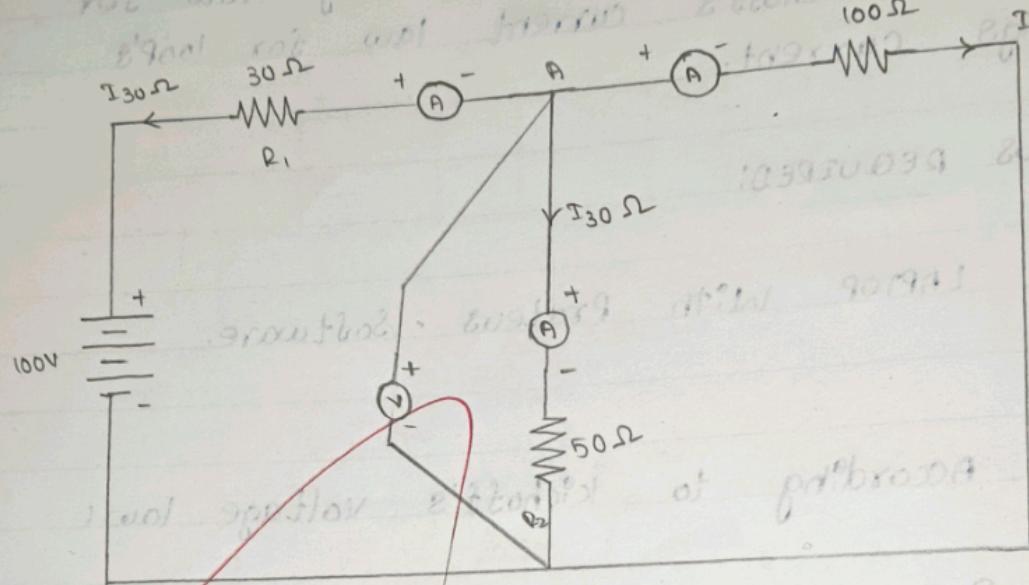
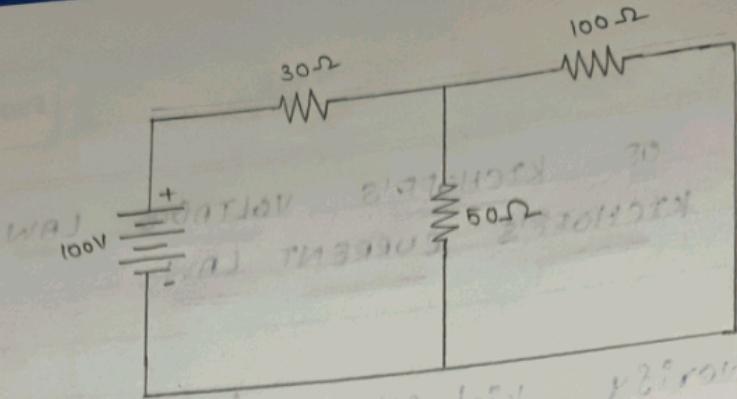
$$V = \left[\frac{1}{30} + \frac{1}{50} + \frac{1}{100} \right] - \frac{100}{30} = 0$$

$$V = [0.0633] - 3.333 = 0$$

$$V = 3.333 = 52.63 \text{ V}$$

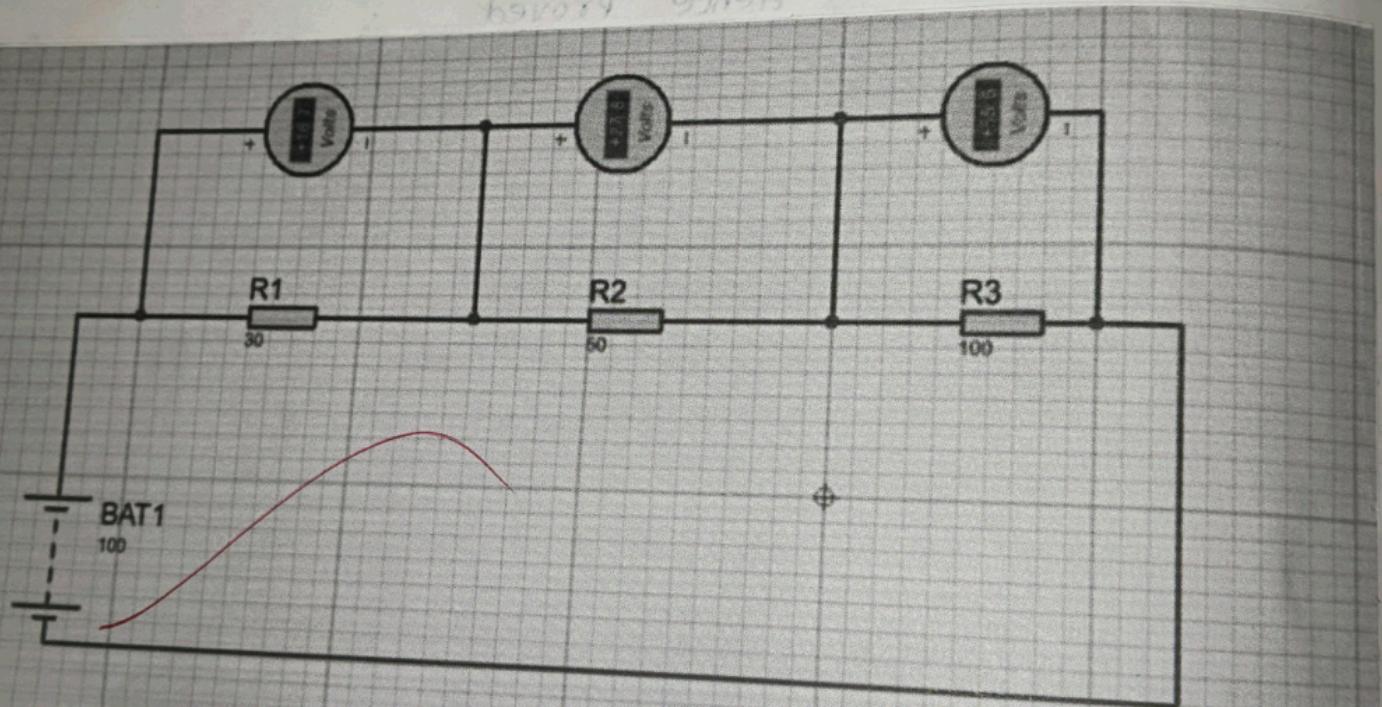
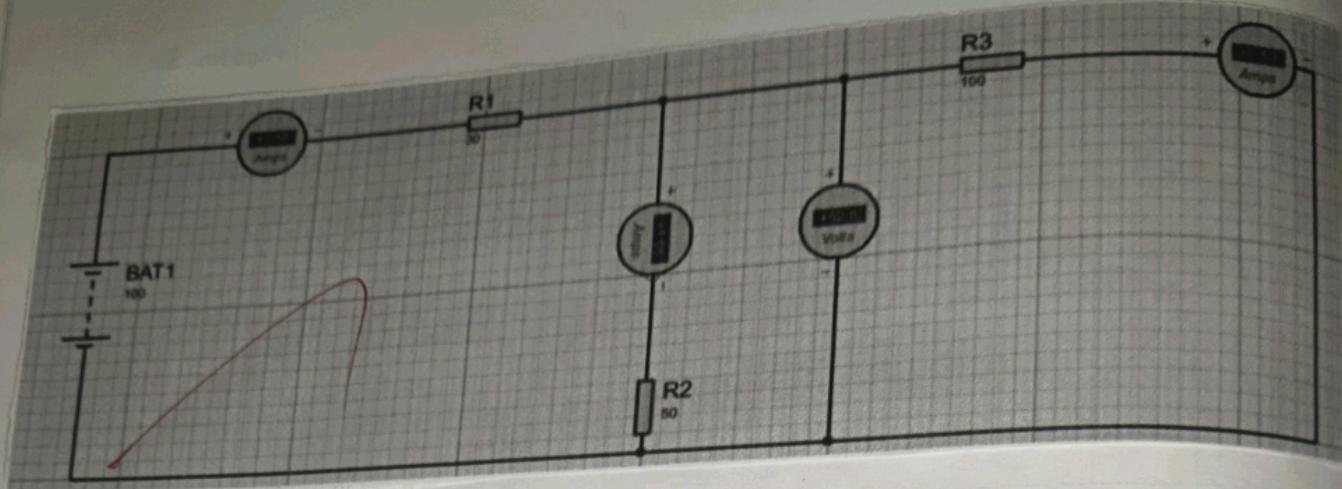
0.633

$$I_{30\Omega} = \frac{V-100}{30} = \frac{52.63}{30} = 1.58 \text{ A}$$



TABULATION: of loops are easier to solve

KCL	$I_{30\Omega}$	$I_{50\Omega}$	$I_{100\Omega}$	V _A
Theoretical	$-I_{58A}$	$1.05A$	$0.53A$	$52.63V$
Practical				



$$e = 868.6 - [868.6] = V$$

$$\frac{V_{sd,sc}}{868.6} = \frac{868.6}{868.6} = 1$$

$$V_{sd,sc} = 868.6 \text{ mV}$$

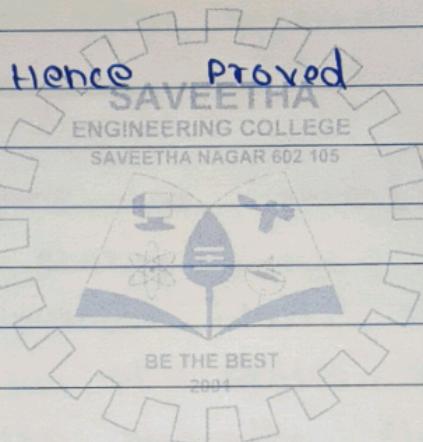
$$I_{50\Omega} = \frac{V}{50} = \frac{52.63}{50} = 1.05 \text{ A}$$

$$I_{100\Omega} = \frac{V}{100} = \frac{52.63}{100} = 0.50 \text{ A}$$

At node A

$$I_{30\Omega} + I_{50\Omega} + I_{100\Omega} = 0$$

$$-1.58 \text{ A} + 1.05 \text{ A} + 0.53 \text{ A} = 0 \text{ A}$$



~~RESULT:~~

~~Thus the Kirchoff's Voltage law and Kirchoff's current law has been verified successfully.~~