

VERIFICATION OF KIRCHHOFF'S VOLTAGE LAW

AND KIRCHHOFF'S CURRENT LAW

Aim :

To Verify Kirchhoff's voltage law for loop's and kirchhoff's current law for loop's followings circuit.

APPARATUS REQUIRED :

LAPTOP with protelus software.

THEORY :

According to Kirchhoff's Voltage law:

Sum of potential Raises are equal to equal to sum of potential Drops in a loop.

In Loop 1 By KVL :

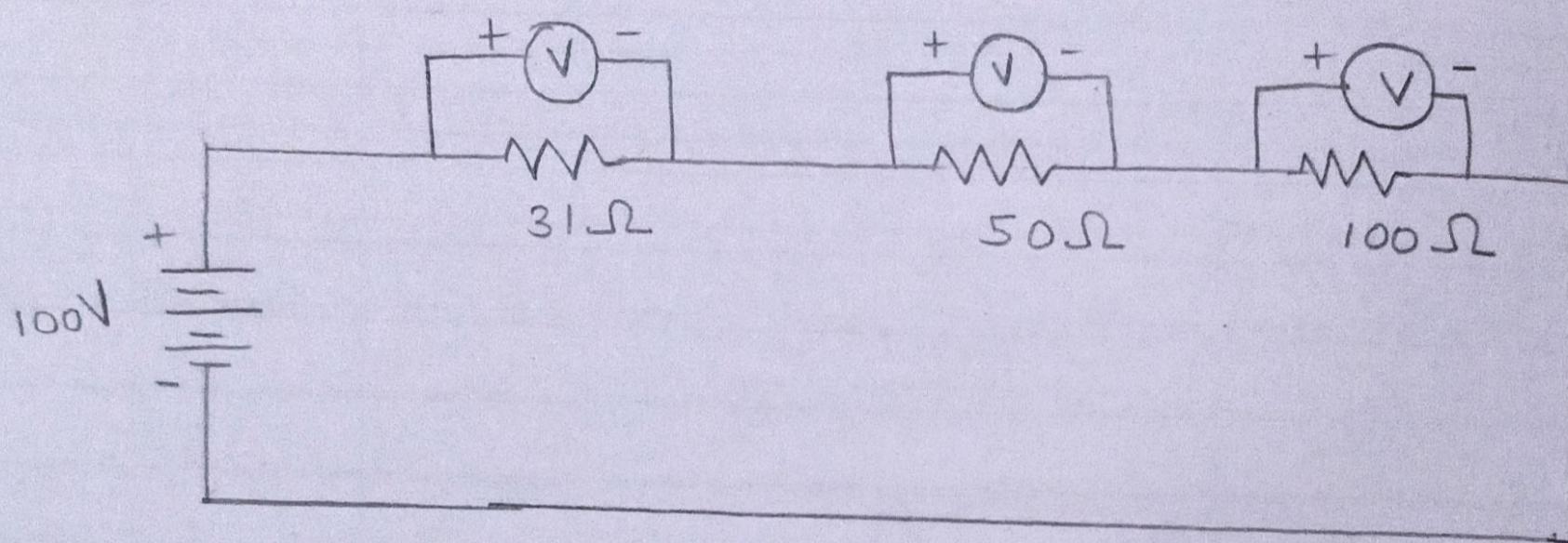
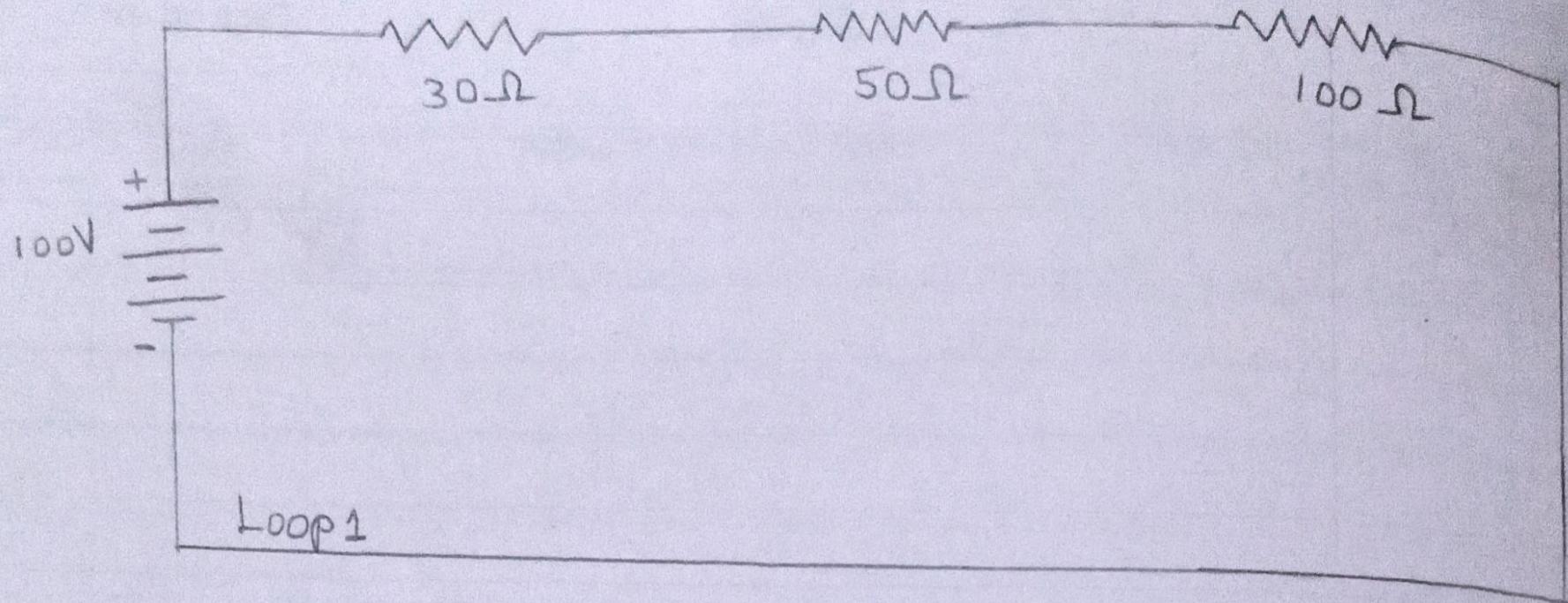
$$V = V_1 + V_2 + V_3 \rightarrow ①$$

$$100 = IR_1 + IR_2 + IR_3$$

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

$$R_{eq} = 180 \Omega$$

$$I = \frac{V}{R_{eq}} = \frac{100}{180} = 0.556 A$$



TABULATION :

KUL	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

$$\begin{aligned}V_1 &= V_{30\Omega} = IR_1 = 0.556 \times 30 = 16.68V \\V_2 &= V_{50\Omega} = IR_2 = 0.556 \times 50 = 27.8V \\V_3 &= V_{100\Omega} = IR_3 = 0.556 \times 100 = 55.6V\end{aligned}$$

Substitute V_1, V_2 and V_3 value in ①

$$100 = 16.68 + 27.8 + 55.6 = 100V = 100V$$

Hence Proved.

Kirchhoff's Current Law :

In a Junction, Incoming current is equal to outgoing current.

At node A :

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

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

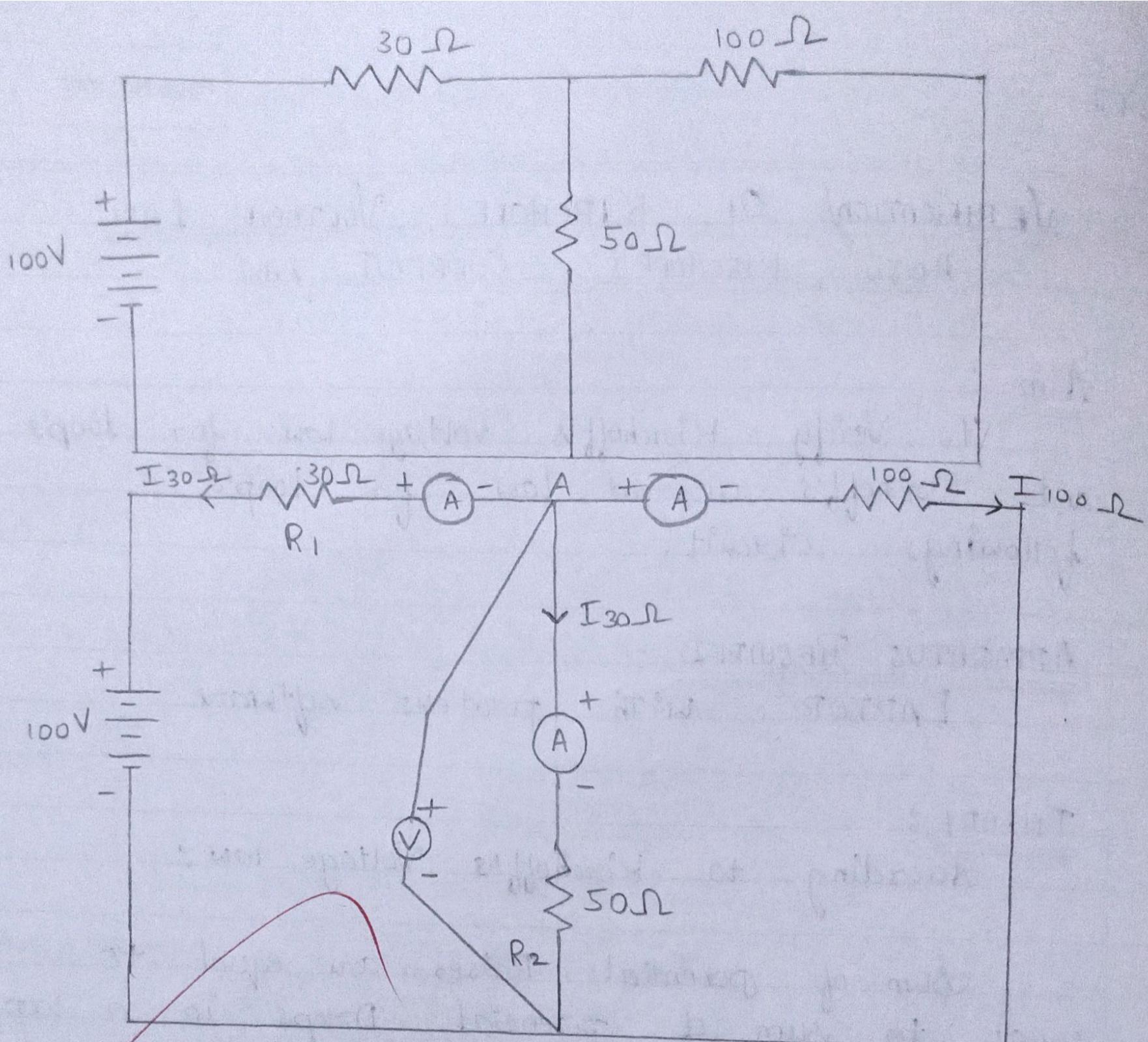
$$V = [1/30 + 1/50 + 1/100] - 100/30 = 0$$

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

$$V = \frac{3.333}{0.633} = 5.263V$$

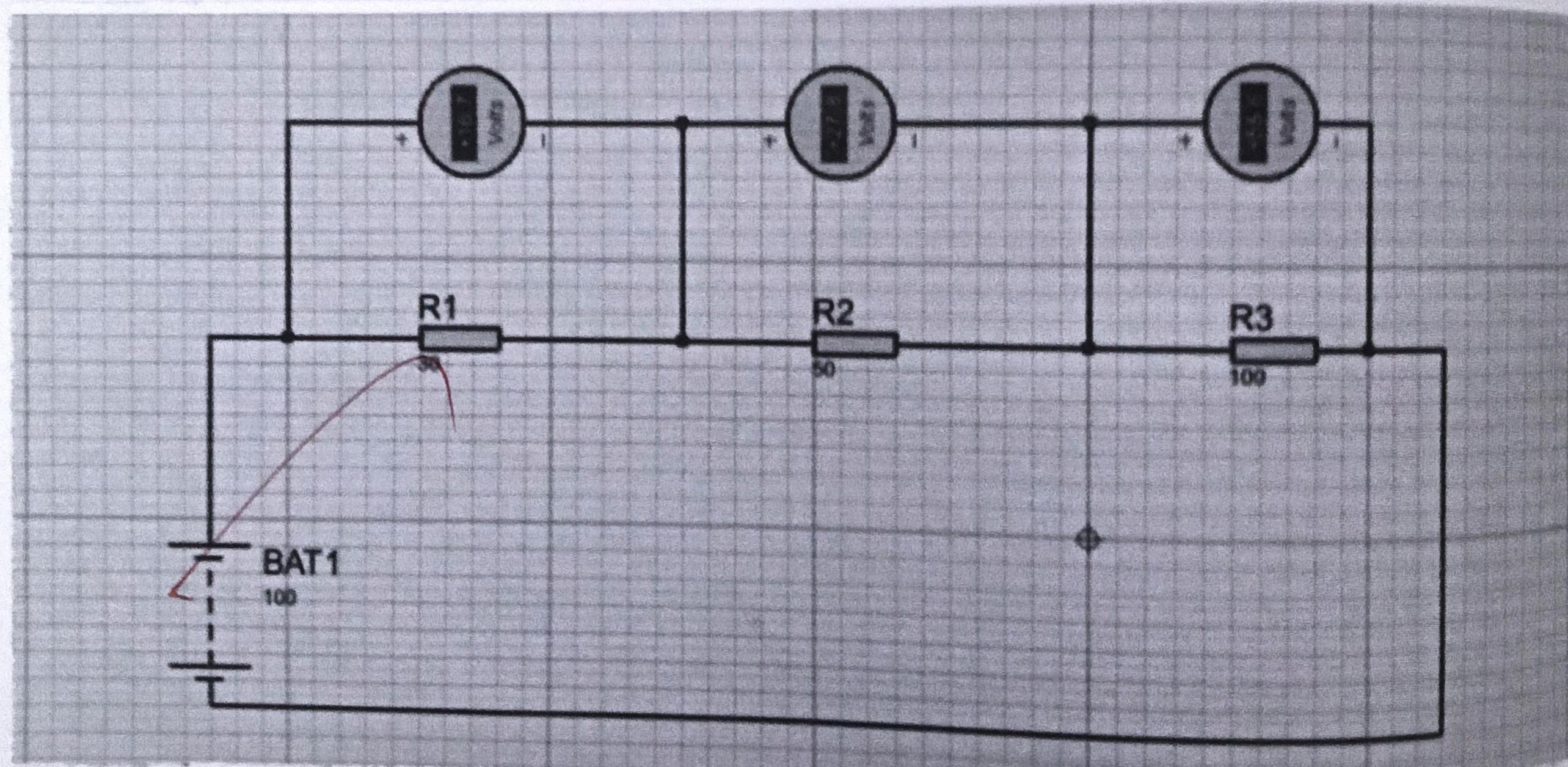
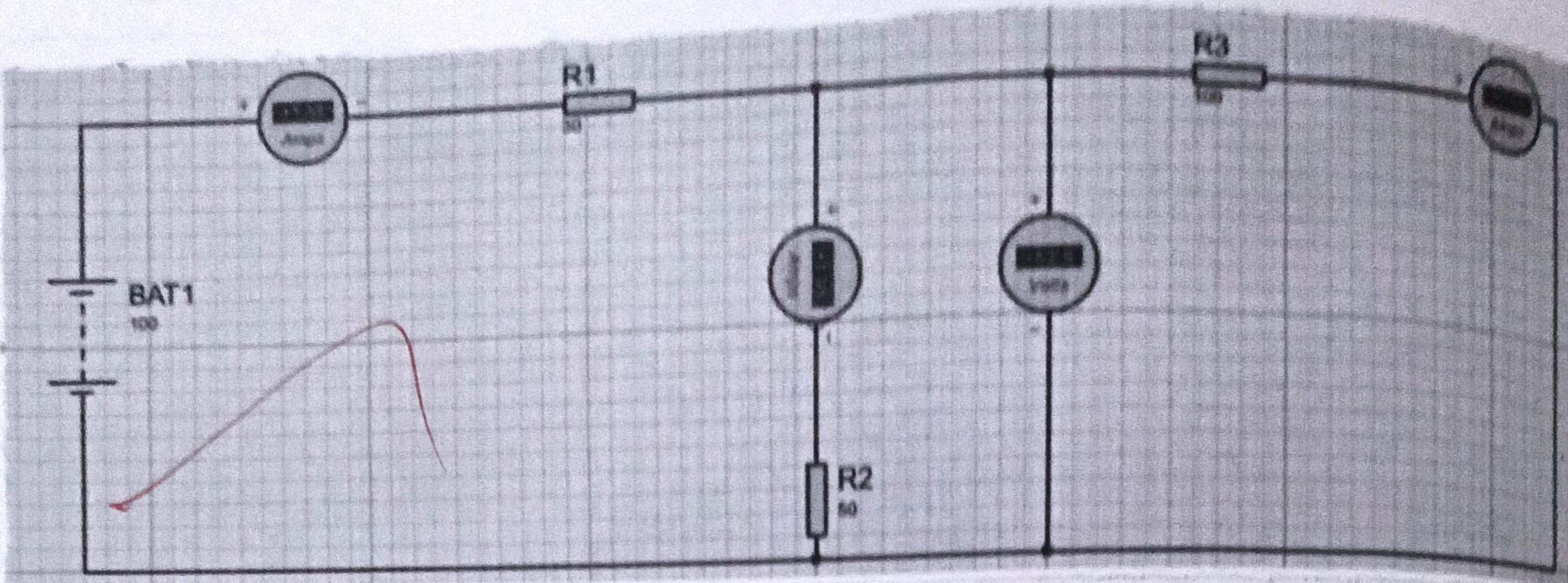
$$= 52.63V$$

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



TABULATION :-

KCL	$I_{30\Omega}$	$I_{50\Omega}$	$I_{100\Omega}$	V_A
Theoretical	-1.58A	1.05A	0.53A	52.63V.
Practical				



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

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

At node A ,

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

$$-1.58A + 1.05A + 0.53A = 0A$$

Hence proved

Q.M.

RESULT :

Thus the Kirchhoff's voltage law and Kirchhoff's current law has been verified successfully.