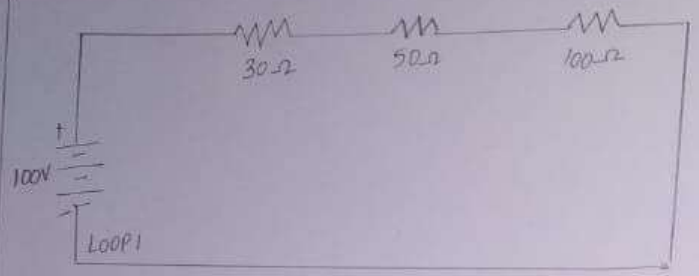
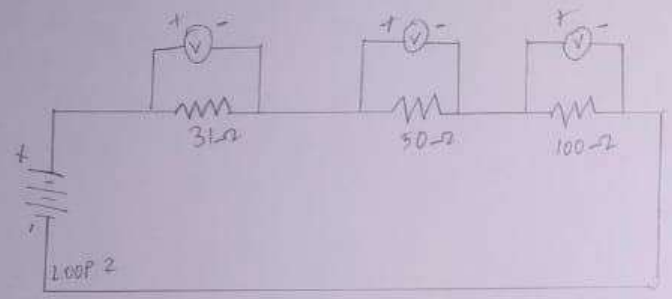
CIRCUIT DIAGRAM:





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	16.63V	27.8V	55.6V	100.05
PRACTICAL	100	16.7V	27.8V	55.6	100.1

EXPT : 1

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

AIM:

To verify Kirchoff's voltage law for loops and Kirchoff's current law for loops following circuit.

APPARATUS REQUIRED:

Laptop with Proteus software

THEORY:

According to Kirchoff's Voltage law: Sum of potential raises are equal to sum of potential drops in a loop.

In loop 1 by KVL:

$$V = V_1 + V_2 + V_3 \quad (1)$$

$$100 = IR_1 + IR_2 + IR_3$$

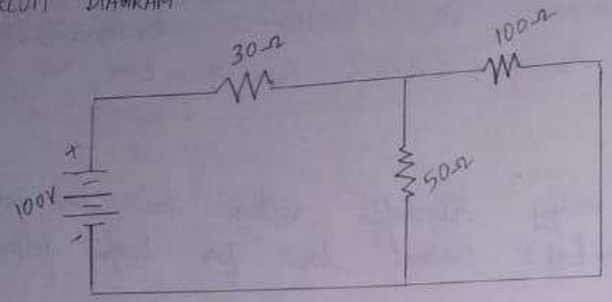
$$R_{eq} = R_1 + R_2 + R_3$$

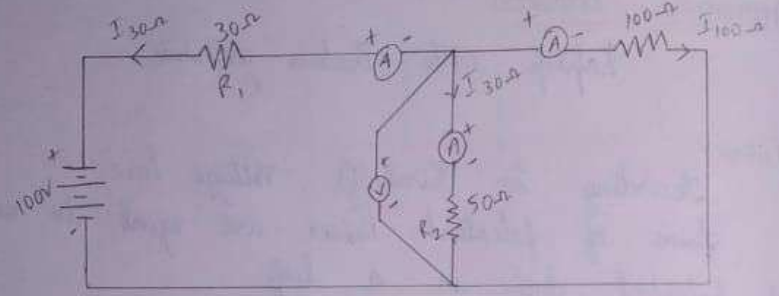
$$R_{eq} = 180\Omega$$

$$I = \frac{V}{R_{eq}}$$

$$= \frac{100}{180} = 0.556A$$

CIRCUIT DIAGRAM





TABULATION:

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

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

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

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

Substitute V_1, V_2 and V_3 value in (1)

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

Hence, proved.

Kirchoff's Current Law:

In a junction, incoming current is equal to outgoing current.

At node A:

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

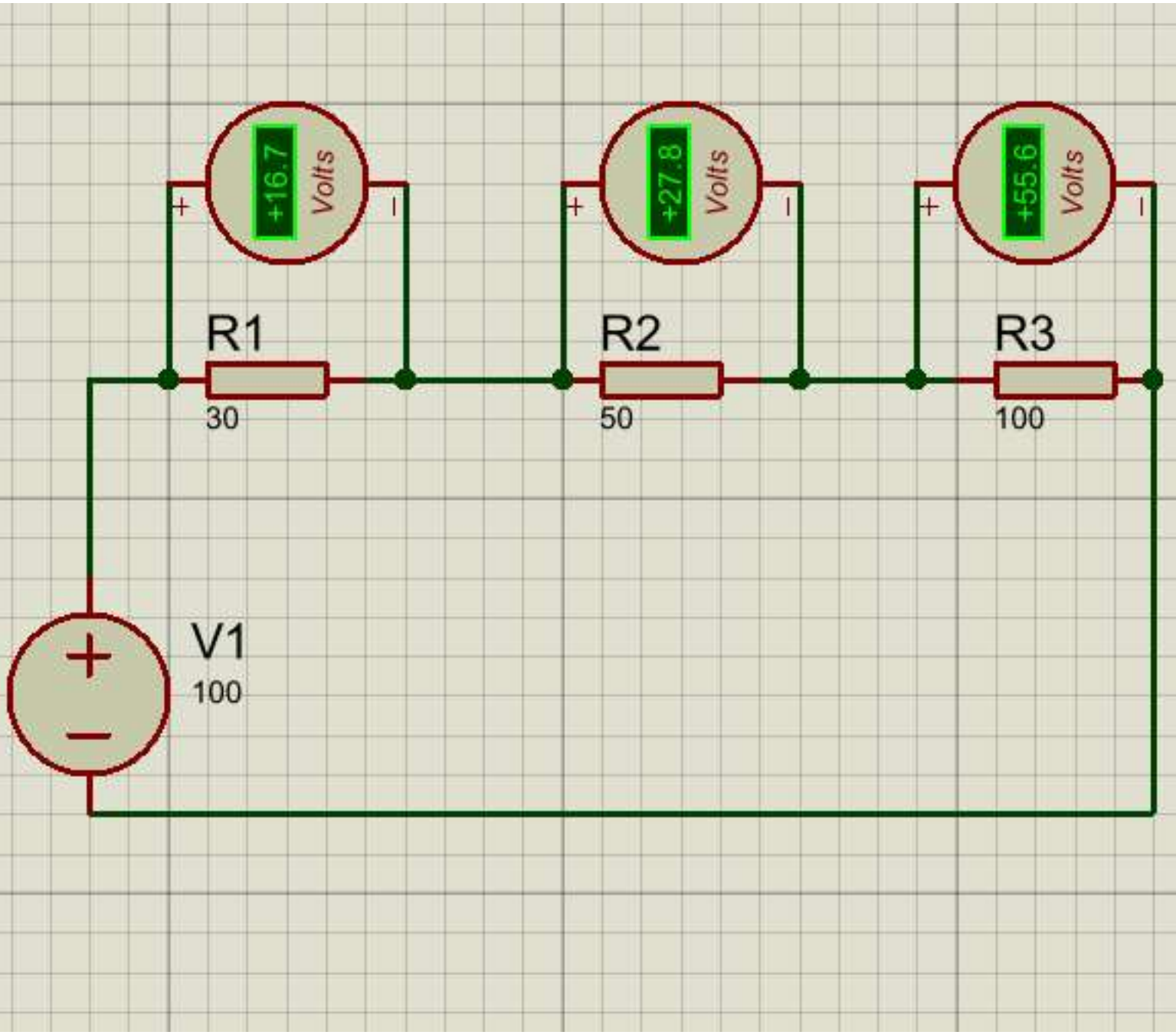
$V = 100/30 + V/50 + V/100 = 0$

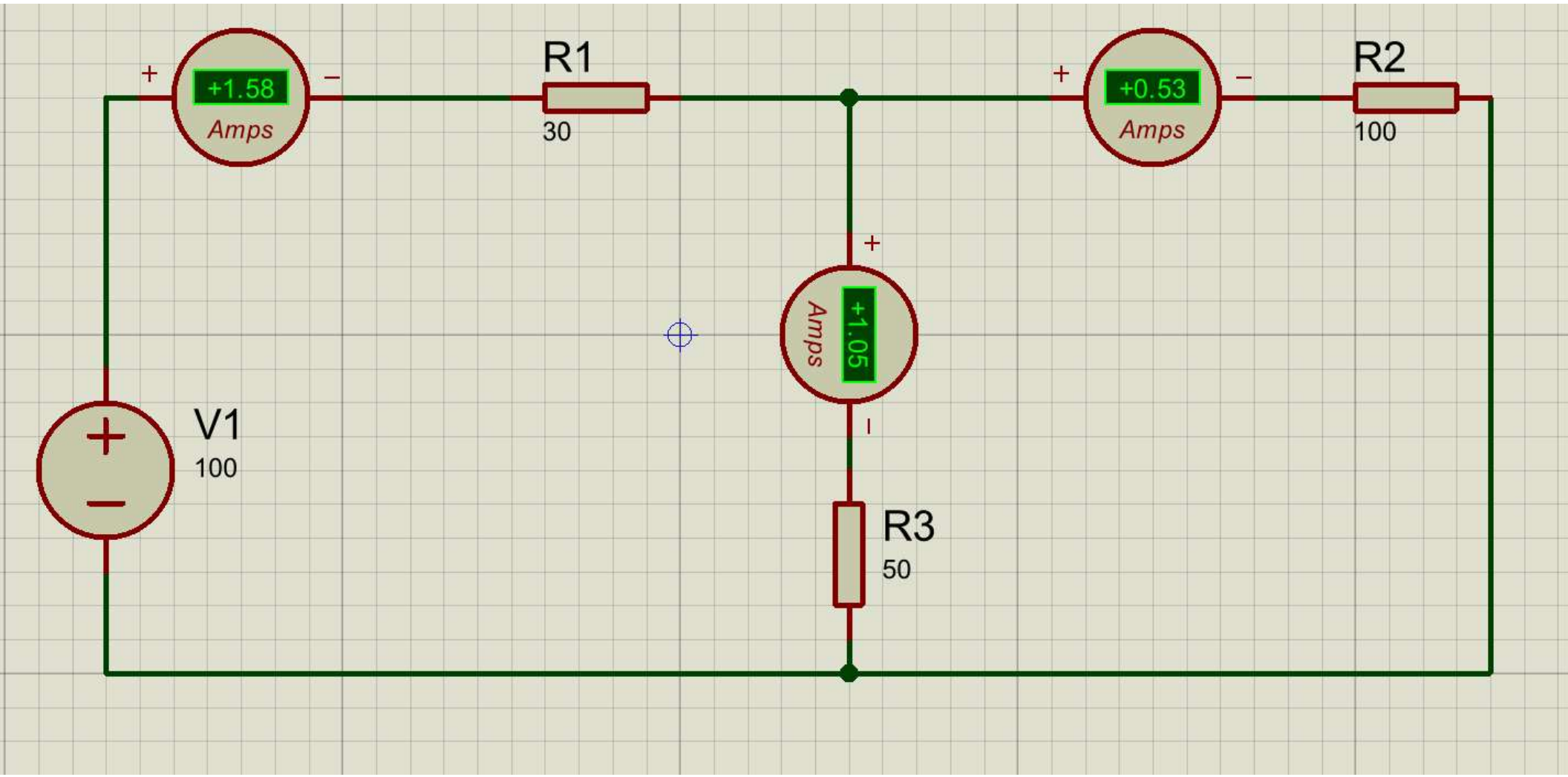
$V = \left[1/30 + 1/50 + 1/100\right] - \frac{100}{30} = 0$

$V = [0.0633] - 3.333 = 0$

$V = \frac{3.333}{0.633} = 52.63V$

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


+16.7
Volts
+27.8
Volts
+55.6
Volts
R1
30
R2
50
R3
100
V1
100


+
+1.58
Amps
–
R1
30
+
+0.53
Amps
–
R2
100
+
Amps
+1.05
–
V1
100
R3
50

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

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

At node A

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

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

Hence, proved.

RESULT:

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