EXP NO: 01

DATE: 4/9/2025

VERIFICATION OF KIRCHOFF'S LAW

AIM:

To verify Kirchoff's voltage law and Kirchoff's current law both theoretically and practically for a given DC circuit.

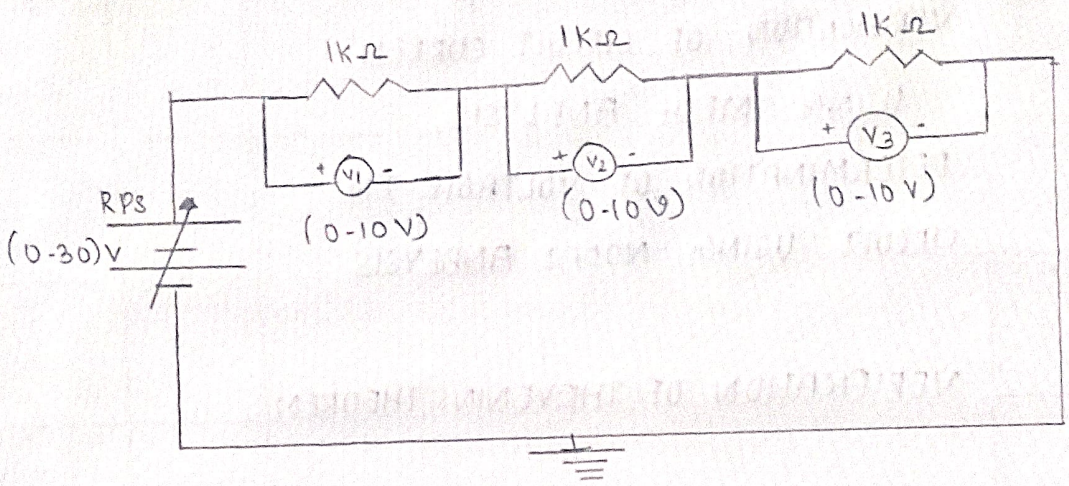
APPARATUS REQUIRED:

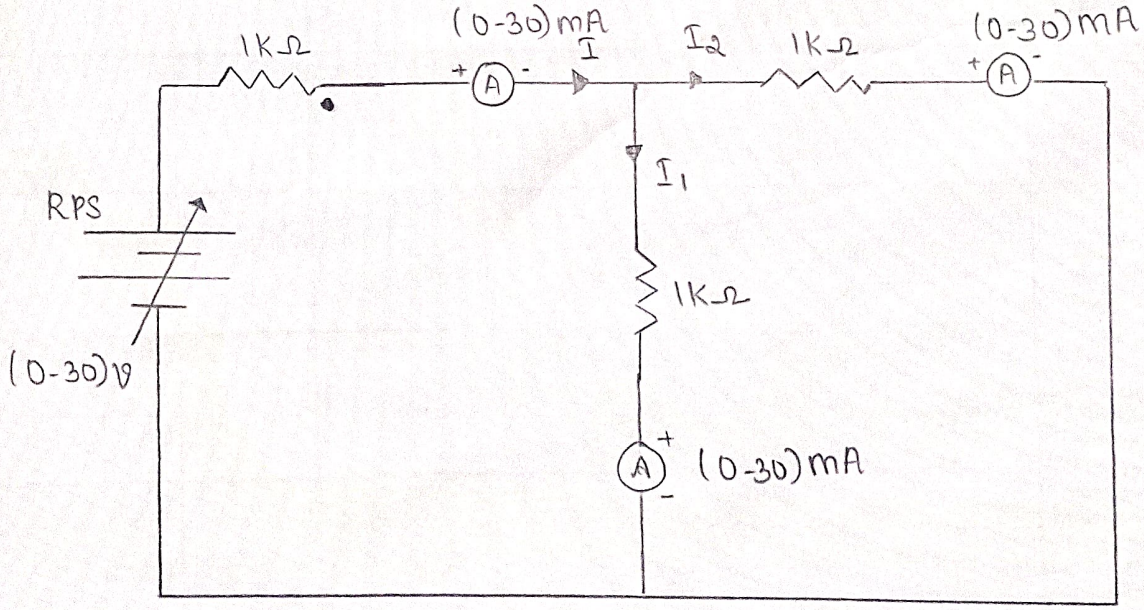
SL.NO	APPARATUS	SPECIFICATION	QUANTITY
1.	Regulated Power Supply [RPS]	(0-30 V)	1
2.	Voltmeter	(0-30 V) MC	3
3.	Ammeter	(0-10 mA)	3
4.	Resistors	1 KΩ	3
5.	Bread board	-	1

PROCEDURE

1. Given connections as per the circuit diagram
2. Switch ON the supply, vary the RPS (Regulated Power Supply) and set a particular Input voltage.
3. Note down the readings of ammeters and voltmeters and tabulate them.
4. Vary the RPS for different input voltages and note down the readings of all the meter
5. Reduce the RPS to its minimum value and Switch OFF the supply.
6. Using the tabulated values, verify kirchoff's law practically, and verify it theoretically.

CIRCUIT DIAGRAM:





TABULAR COLUMN:-

V (volts)	V_1 (volts)	V_2 (volts)	V_3 (volts)	$V = V_1 + V_2 + V_3$ (volts)	I (amps)	I_1 (amps)	I_2 (amps)	$I = I_1 + I_2$ (amps)
3	0.91	0.93	0.91	2.74	6	3.07	3.07	6.15
6	2.0	1.98	6.63	12.00	2.01	5.99	5.99	11.98
9	3.16	3.21	9.35	17.7	3.15	893	8.96	17.8

calculation :-

By ohm's law

$$I = \frac{V}{R} = \frac{3}{1.5}$$

$$= 2mA$$

$$I_1 = I \times \frac{R_1}{R_1 + R_2}$$

$$= 2 \times \frac{1}{2}$$

$$= 1mA$$

$$I_2 = I \times \frac{R_2}{R_1 + R_2}$$

$$\Rightarrow 2 \times \frac{1}{2}$$

$$= 1mA$$

Practical verification :-

- $\frac{V}{I}$ should be constant (ohm's law)

V should be equal to $(V_1 + V_2 + V_3)$

I_1 should be equal to $(I_2 + I_3)$

Theoretical verification :

By Ohms law :

1) $I = \frac{V_1}{R} = \frac{3}{3 \times 10^3}$

$= 1mA$

2) $I = \frac{V_2}{R} = \frac{6}{3 \times 10^3}$

$= 2mA$

3) $I = \frac{V_3}{R} = \frac{9}{3 \times 10^3}$

$= 3mA$

In KCL :

Parallel resistance :

$R_{eq} = \frac{R_B R_C}{R_B + R_C}$

$= \frac{1 \times 10^3 \times 10^3}{10^3 + 10^3}$

$= \frac{10^6}{2 \times 10^3}$

$= 0.5 k\Omega$

Total resistance :

$R_A + R_{eq}$

$= 1 + 0.5$

$= 1.5 k\Omega$

RESULT:-

Thus kirchoff's current law and kirchoff's voltage law are verified practically and theoretically.