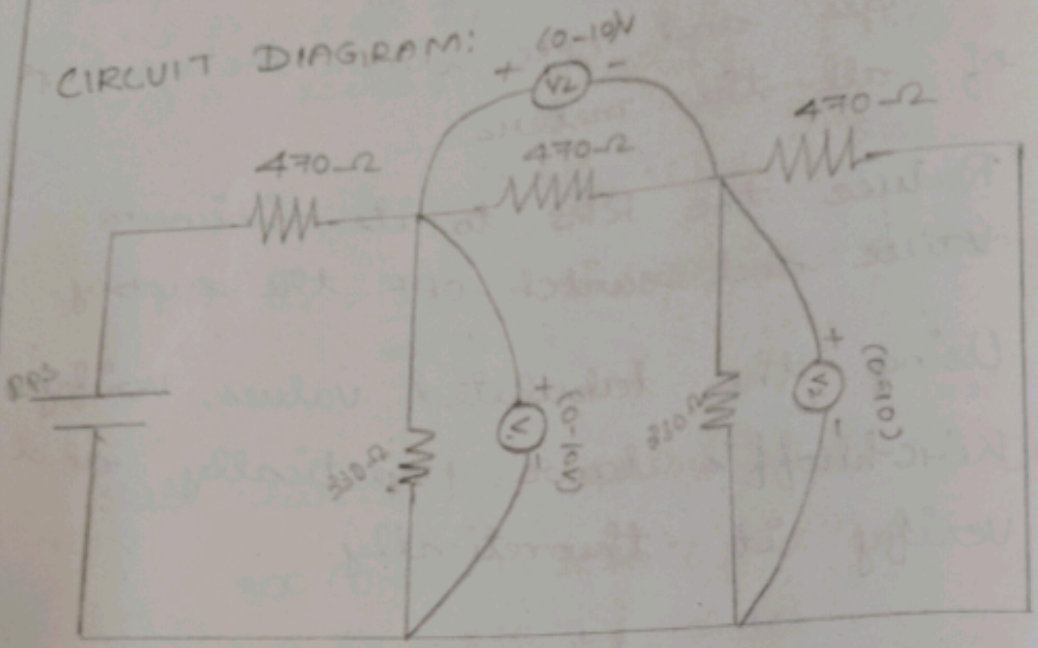
CIRCUIT DIAGRAM:



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ERP NO: 3 DATE: 18.09.25	DETERMINATION OF VOLUME IN CIRCUIT USING NODAL ANALYSIS

AIM:

To determine the voltage in the circuit using nodal analysis both theoretically and practically for a given DC circuit.

APPARATUS REQUIRED:

S. NO	APPARATUS	SPECIFICATION	QUANTITY
1.	Regulated Power Supply (RPS)	(0 - 30V)	1
2.	Multimeter	-	1
3.	Resistor	470Ω, 330Ω	3, 2
4.	Bread Board	-	1

PROCEDURE:

1. Give 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 ammeter and Voltmeter and tabulate them.

TABULAR COLUMN:

PARAMETER	THEORETICAL	PRACTICAL
I_1	0.638 V	0.64 V
I_2	0.4521 V	0.48 V
$I_1 - I_2$	0.186 V	0.19 V

CALCULATION:

let P point lie eground : $V_0 = 0$

let potential at points A and B be V_A and V_B

using nodal analysis at node A:

current entering = 0

current leaving : $\frac{V_A}{330} + \frac{V_A - V_B}{470} + \frac{V_A - 2}{470}$

By KCL, $\frac{V_A}{330} + V_A - V_B/470 + \frac{V_A - 2}{470} = 0$

$$\frac{2V_A - V_B - 2}{470} + \frac{V_A}{330} = 0$$

$$330(2V_A - V_B - 2) + 470V_A = 0$$

$$660V_A - 330V_B - 660 + 470V_A = 0$$

$$1130V_A - 330V_{13} = 660 \rightarrow (1)$$

at node B:

current entering = 0

current leaving = $\frac{V_B - V_A}{470} + \frac{V_B}{470} + \frac{V_B}{330}$

By KCL, $\frac{V_B - V_A}{470} + V_B/470 + V_B/330 = 0$

$$330(2V_B - V_A) + 470V_B = 0$$

$$660V_B - 330V_A + 470V_B = 0$$

4. Vary
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4. Vary the RPS to its minimum value and switch OFF the supply.

5. Reduce the RPS to its minimum value and switch OFF the supply.

6. Using the tabulated values, verify Kirchhoff's laws practically and verify it theoretically.

$$-330\,V_A + 1130\,V_B = 0 \quad \rightarrow (2)$$

Solving (1) and (2)

$V_A = 0.638\ V = V_1$

$V_B = 0.186\ V = V_3$

$V_2 = V_A - V_B = 0.638 - 0.186$

$= 0.4521\ V$

RESULT:

Thus, the nodal analysis verified practically and theoretically. The resultant voltages for 2V supply are:

a) The voltage V_1 is 0.638 V

b) The voltage V_2 is 0.186 V

c) The voltage V_3 is 0.452 V