EXP NO: 03

DATE: 18/9/2025

DETERMINATION OF VOLTAGE 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

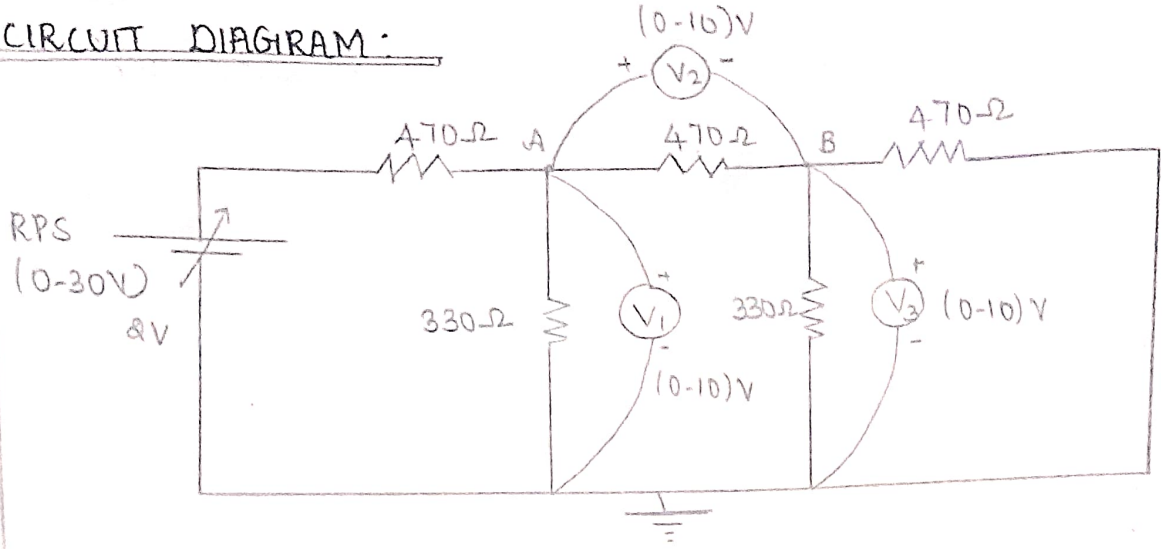
APPARATUS REQUIRED:-

SL.NO	APPARATUS	SPECIFICATION	QUANTITY
1	Regulated Power Supply[RPS]	(0-30V)	1
2	Multimeter	-	1
3	Resistors	470Ω, 330Ω	3, 2
4	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 input voltages and note down the readings of all the meters
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:

Parameters	Theoretical	Practical
I_1	0.638V	0.69V
I_2	0.4521V	0.48V
I_1-I_2	0.186V	0.19V

CALCULATION :-

Let D point be ground $= V_D = 0$

Let potential at points A and B be V_A and V_B using node 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,

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

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

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

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

$$1130 V_A - 330 V_B = 660 \rightarrow (1)$$

at node B:

current Entering = 0

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

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

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

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

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

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