Course Name:	**Elements of Electrical and Electronics Engineering Laboratory**	**Semester:**	**I/II**
Date of Performance:	**17 / 9 /2024**	**Batch No:**	**C5-2**
Student Name:	**Nidhesh Gomai**	**Roll No:**	**16014224025**
Faculty Sign & Date:		**Grade/Marks:**	**/ 20**

Experiment No: 3

Title: Thevenin's Theorem & Norton's Theorem

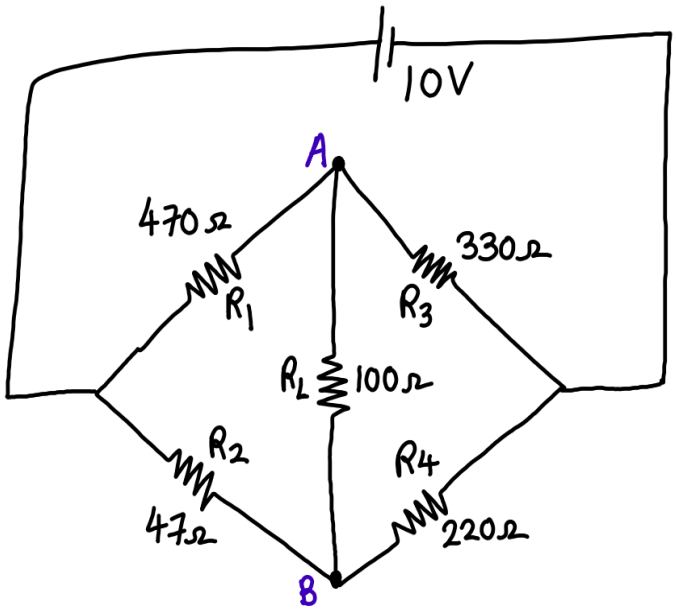
Aim and Objective of the Experiment:

- To Verify for Thevenin's Theorem for the circuit
- To Verify Norton Theorem for the Circuit.

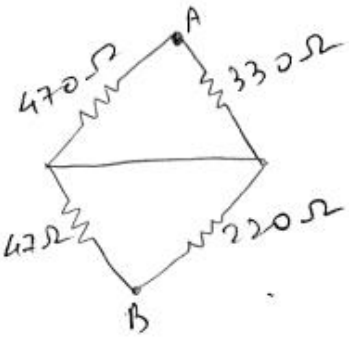
COs to be achieved:

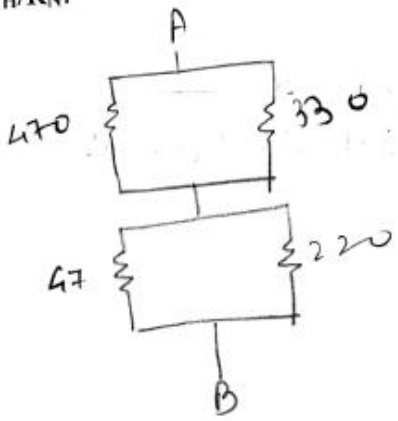
CO1: Analyze resistive networks excited by DC sources using various network theorems.

Circuit Diagram:

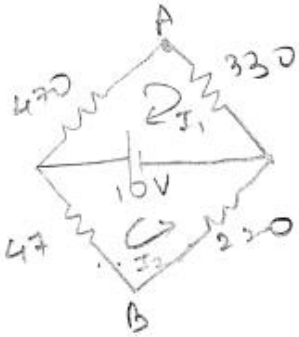


Task 1: Circuit Diagram to measure R_{TH}/R_N:

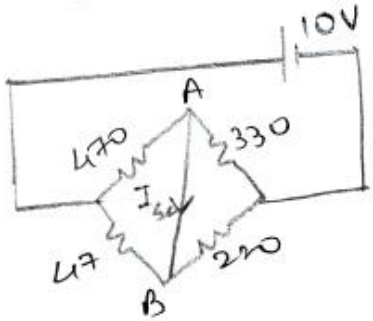




Task 2: Circuit Diagram to measure V_{TH}:



Task 3: Circuit Diagram to measure I_{SC}:



Nidhesh Gomai
C5-2 16014224025

Stepwise-Procedure:

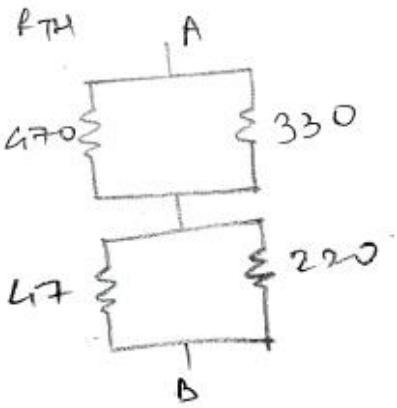
Thevenin's Theorem:

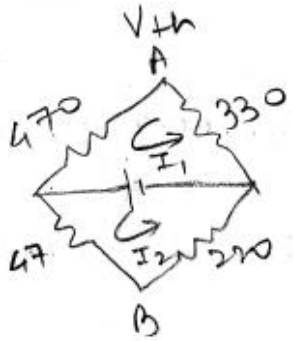
1. Connect the circuit as shown in the circuit diagram.
2. Set 10V and measure open circuit voltage V_{Th} across load terminals A and B.
3. Replace all voltage sources by Short circuit and measure R_{Th} across terminals A and B as per the circuit diagram shown in the figure.
4. Draw Thevenin's equivalent circuit and determine the value of load current from it.
5. Verify the results theoretically.

Norton's Theorem:

1. Connect the circuit as shown in the circuit diagram.
2. Set the voltages 10V
3. Remove the load resistance and measure the short circuit current I_{SC} through A and B terminals.
4. Replace all the voltage sources by Short circuit and measure R_{Th} across terminals A and B as per the circuit diagram shown in the figure.
5. Draw Norton's equivalent circuit and determine the value of load current.
6. Verify the results theoretically

Calculations: Thevenin's Theorem





$V_B - 220I_2 - 330I_1 - V_A = 0$

$V_{AB} = -220I_2 - 330I_1$

$-10 - 470I_1 - 330I_1 = 0$

$I_1 = \frac{-10}{800} = -0.0125A$

$10 - 47I_2 - 220I_2 = 0$

$I_2 = \frac{10}{267}$

$I_2 = 0.0374A$

$R_{th} = (470 \| 330) + (47 \| 220)$

$= \frac{470 \times 330}{470+330} + \frac{47 \times 220}{47+220}$

$= 232.60\ \Omega$

$V_{AB} = -220(0.0374) - 330(-0.0125)$

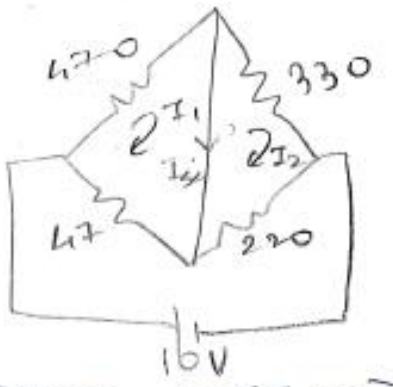
$V_{AB} = -8.228 + 4.125 = -4.103V$

Nidhesh Goma
C5-2 160142240025

Norton's Theorem :

I_{SC} / I_N

Nidhesh Gomai
CS-2 16014224025



$-470 I_1 - 47(I_1 - I_3) = 0$ — (I)

$-330 I_2 - 220(I_2 - I_3) = 0$ — (II)

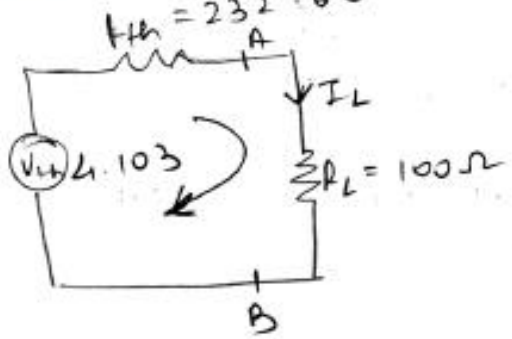
$10 - 47(I_1 - I_3) - 220(I_2 - I_3) = 0$ — (III)

Observation Table:

	V_{TH} (V)	R_{TH} / R_N (Ω)	I_N (mA)	I_L (mA)
Theoretical value	−4.103V	232.60Ω	−17.6	−12.3
Practical value	−4.10V	231.2Ω	−17.4	−12.1

Draw Thevenin's Equivalent circuit

$R_{th} = 232.60$



$I_L = \frac{V_{th}}{R_{th} + R_L}$

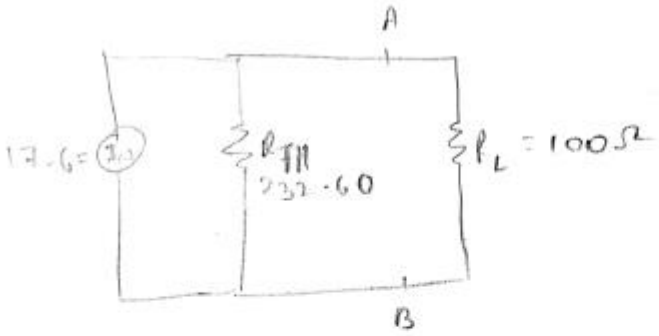
$I_L = \frac{-4.103}{332.60}$

$I_L = -0.0123$ A

$I_L = -12.3$ mA

Draw Norton's Equivalent circuit

Nidhesh Gomai
C5-2 16014224025
Nidhesh



Conclusion:

We understood to analyze resistive networks using DC source. we ~~cannot~~ learnt how to deal with resistances on bread board.

Signature of faculty in-charge with Date: