Course Name:	**Elements of Electrical and Electronics Engineering**	**Semester:**	**II**
Date of Performance:	**05/05/2022**	**Batch No:**	**E1**
Faculty Name:		**Roll No:**	**16010321005**
Faculty Sign & Date:		**Grade/Marks:**	**/ 25**

Experiment No: 3

Title: Thevenin's Theorem & Norton's Theorem.

Aim and Objective of the Experiment:

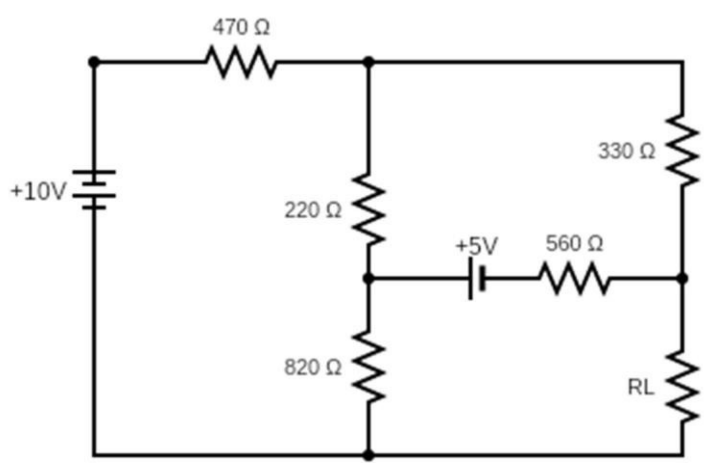
- To Verify for Thevenin's Theorem for the circuit
- To Verify Norton Theorem for the Circuit.

COs to be achieved:

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

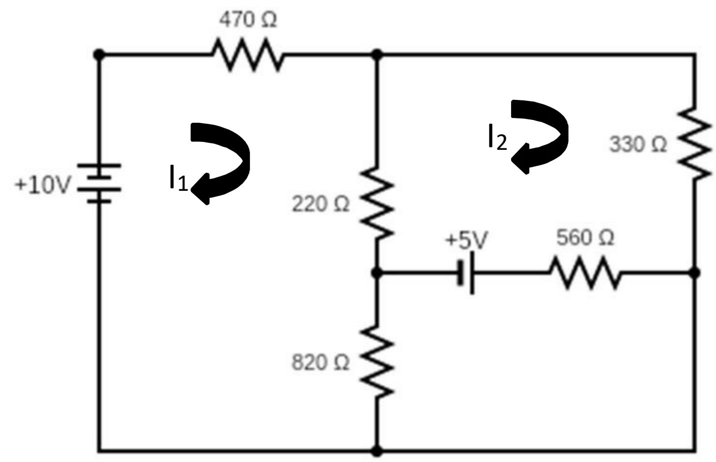
Circuit Diagram/ Block Diagram:

Circuit Diagram

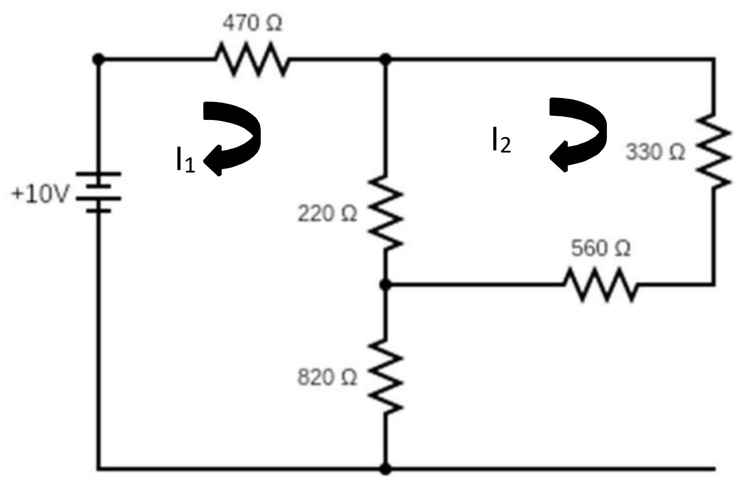


Task 1: Circuit Diagram to measure V_{Th}:

Task 2: Circuit Diagram to measure $Isc=I_N$:



Task 3: Circuit Diagram to measure Rth=R_N:



Stepwise-Procedure:

Thevenin's Theorm

1. Connect the circuit as shown in the circuit diagram.
2. Set V1, V2 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.

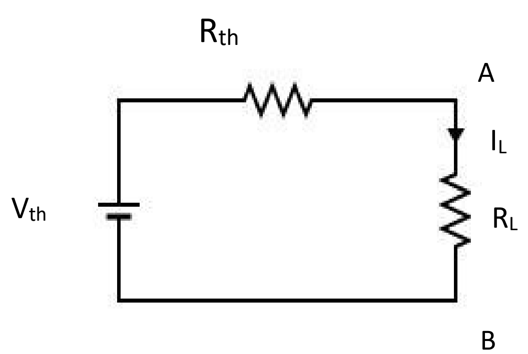
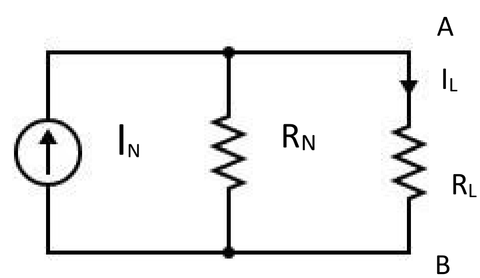
Norton's Theorem

1. Connect the circuit as shown in the circuit diagram.
2. Set the voltages V_1, V_2
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

Observation Table:

	Vth	Rth (Ω)	Isc (I_N)
Practical value	**4.4 V**	**506 Ohm**	**8.6 mA**
Theoretical value	**4.495 V**	**506.405 Ohm**	**8.8 mA**

Thevenin's equivalent circuit	**Norton's Equivalent Circuit**
	

Theoretical Calculation:

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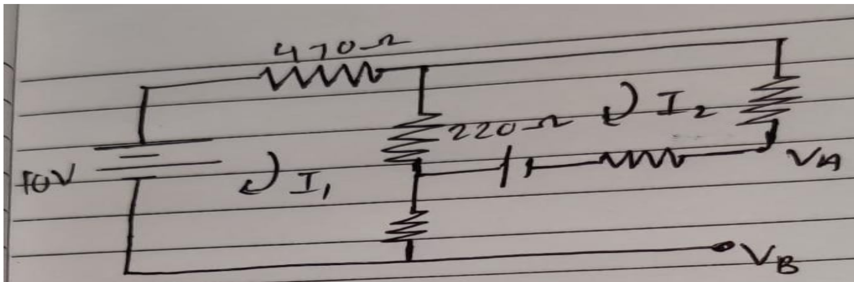


Applying KVL to Mesh (2)

$$5 + 220(I_1 - I_2) - 330 I_2 - 560 I_2 = 0$$

$$222 I_2 - 44 I_1 = 1 \quad -(1)$$

Applying KVL to Mesh (1)

$$10 - 470 I_1 - 200 (I_1 - I_2) - 820 I_1 = 0$$

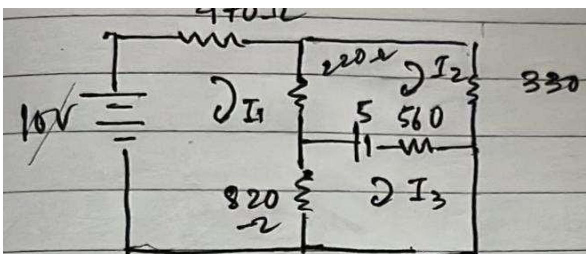
$$151 I_1 - 22 I_2 = 1 \quad -(2)$$

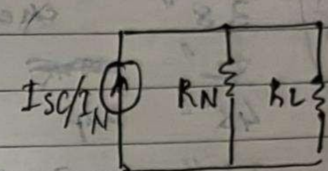
from (1) and (2)

$I_1 = 745\ mA$ $\quad I_2 = 5.99\ mA$

$$V_A - 560 I_2 + 5 - 820 I_1 - V_B = 0 \rightarrow V_A - V_B = 4.49V$$

$$V_{AB} = V_{TH} = V_A - V_B = 4.4962\ V$$





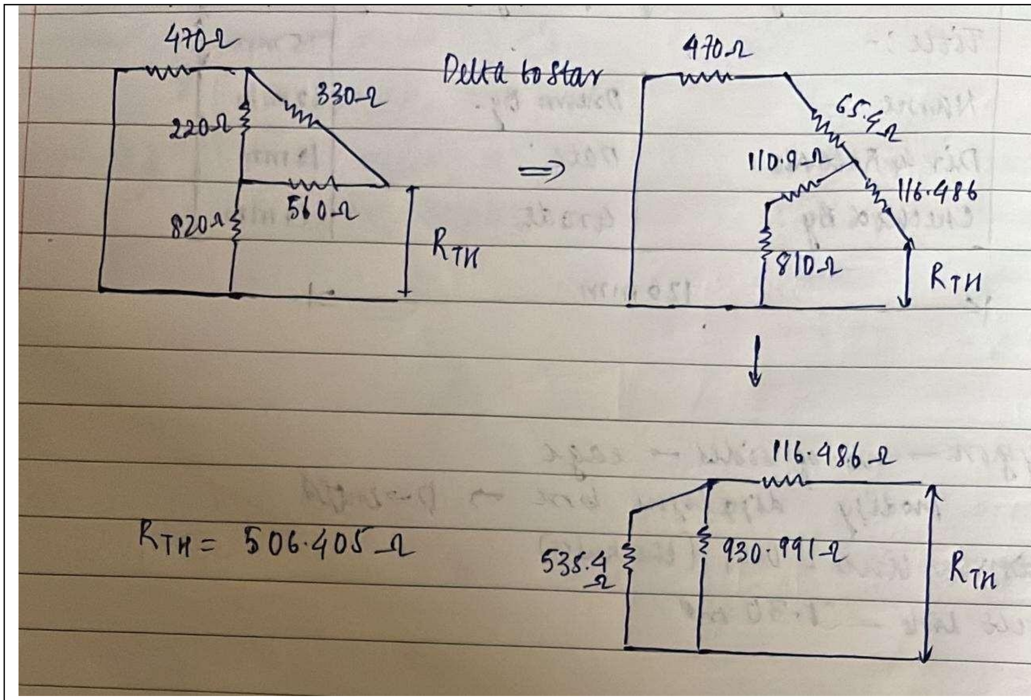
mesh ① → $+10 - 470 I_1 - 220 (I_1 - I_2) - 820 (I_1 - I_3) =$

mesh ② → $-330 I_2 - 560 (I_2 - I_3) + 5 - 220 (I_2 - I_1) = 0$

mesh ③ → $-820 (I_3 - I_1) - 5 - 560 (I_3 - I_2) = 0$

$I_1 = 13.13\ mA$ $\quad I_3 = 8.87\ mA$

$I_2 = 11.59\ mA$



Conclusion:

Hence we learnt and verified Thevenin's and Norton's theorem through this experiment.

Signature of faculty in-charge with Date: