Course Name:	**Elements of Electrical and Electronics Engineering Laboratory**	**Semester:**	✓ **I/II**
Date of Performance:	/ /20--	**Batch No:**	C-5(3)
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Faculty Sign & Date:		**Grade/Marks:**	/ 20

Experiment No: 3

Title: Thevenin's Theorem & Norton's Theorem

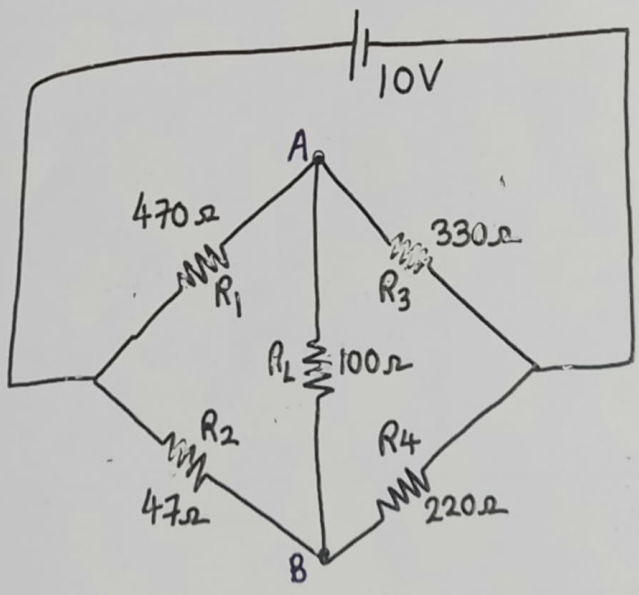
Aim and Objective of the Experiment:

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

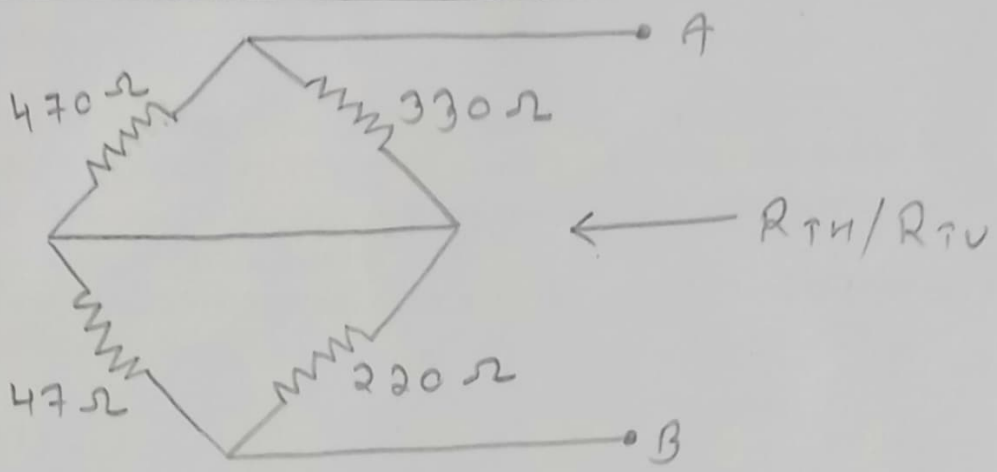
COs to be achieved:

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

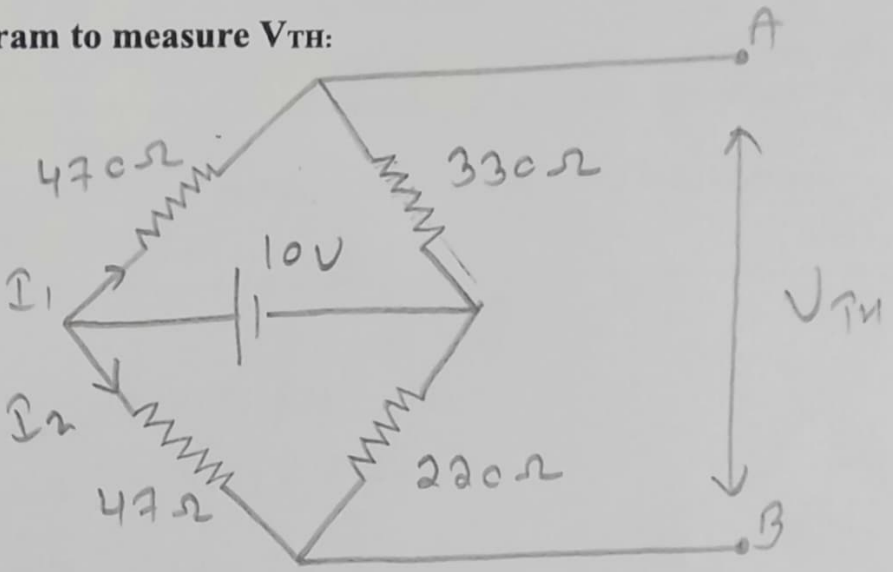
Circuit Diagram:



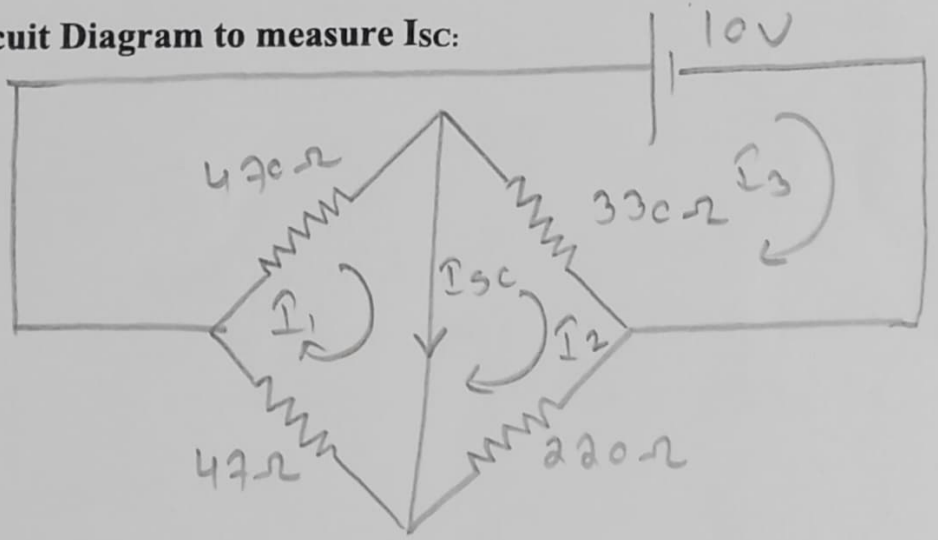
Task 1: Circuit Diagram to measure R_{TH}/R_N:



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



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



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:

1) R_{TH}

$470 \| 330\,\Omega = 193.87\,\Omega$

$47 \| 220\,\Omega = 38.72\,\Omega$

$R_{TH} = 193.87 + 38.72 = \underline{232.59\,\Omega}$

2) V_{TH}

$I_1 = \frac{10}{470 + 330} = 0.0125A \qquad I_2 = 0.0374A$

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

$= -220(0.0374) + 330(0.0125)$

$= -4.18V(\uparrow), +4.18V(\downarrow)$

3) Thevenin's eq

$I_L = I_{100\Omega} = \frac{-4.18}{232.59 + 100}$

$= -0.0126$

$= \underline{-12.6\,A}$

Observation Table:

KVL at loop 1

$-47I_1 - 470(I_1 - I_3) = 0$

$-517I_1 + 470I_3 = 0 \longrightarrow 1)$

KVL at loop 2

$-550I_2 + 330I_3 = 0 \longrightarrow 2)$

KVL at loop 3

$-10 - 330(I_3 - I_2) - 470(I_3 - I_1) = 0$

$470I_1 + 330I_2 - 800I_3 = 10 \longrightarrow 3)$

Solving 1, 2 & 3

$I_1 = -0.0526\ A$

$I_2 = -0.0342\ A$

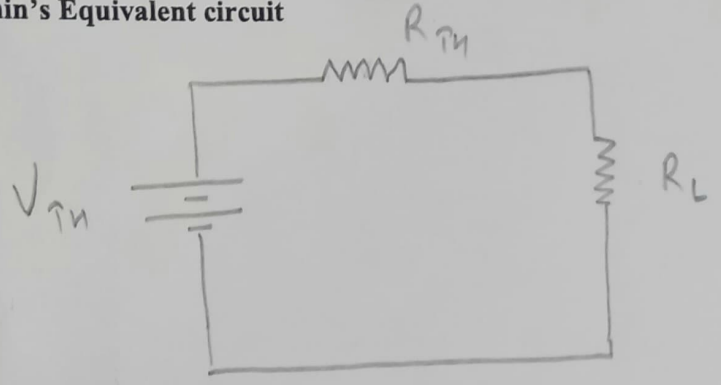
$I_3 = -0.0572\ A.$

$I_{SC} = I_1 - I_2 = -0.0184\ A.$

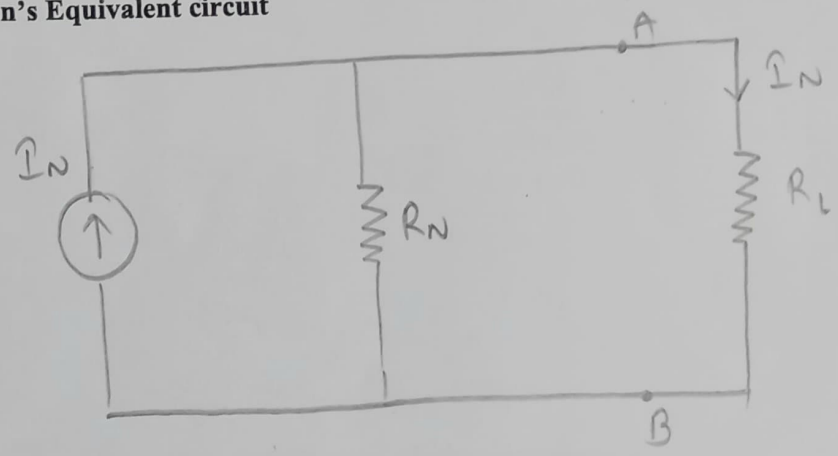
$= -17.4\ mA$

	V_{TH} (V)	R_{TH} / R_N (Ω)	I_N (mA)	I_L (mA)
Theoretical value	-4.18	232.59	-17.4	-12.6
Practical value	-4.109	2324.52	-18.1	-12.26

Draw Thevenin's Equivalent circuit



Draw Norton's Equivalent circuit



Conclusion:

The following experiment helps us to understand the steps to verify thevinin and Nortan theorm
The exp also helped us to examine bilinear network excited by source using various network theorms.