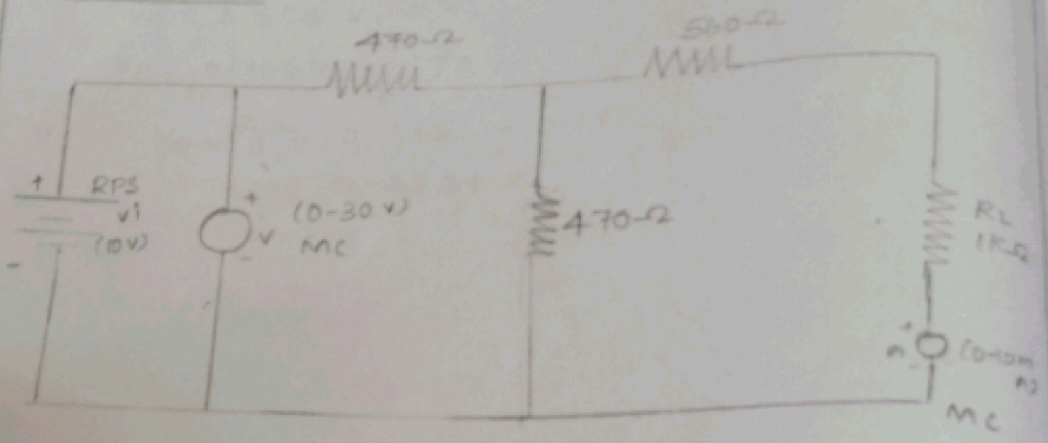
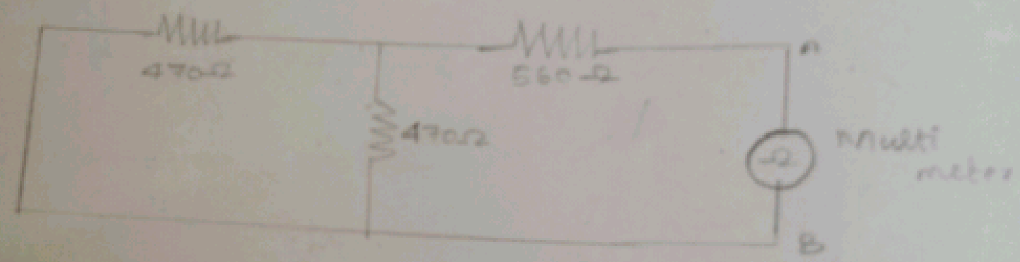
CIRCUIT DIAGRAM: VERIFICATION OF THEVENINS THEOREM

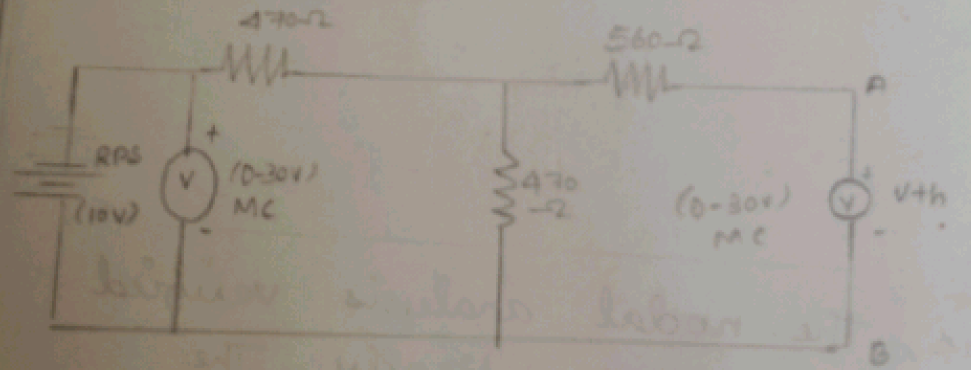
To measure I_L:



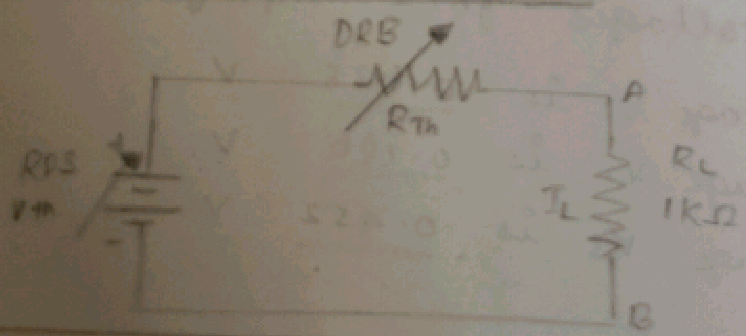
To measure R_{Th} or R_s



To measure V_{Th} or V_{oc}



Thevenin's equivalent circuit:



EXP NO: 4
DATE: 19.09.25

AIM:

To

and

APPAR

SL. NO	
1.	
2.	
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5.	
6.	

EXP NO: 4 DATE: 19.09.25	VERIFICATION OF THEVENIN'S THEOREM

AIM:

To verify Thevenin's theorem practically and theoretically for the given DC circuit.

APPARATUS REQUIRED:

SL. NO	APPARATUS	SPECIFICATION	QUANTITY
1.	Regulated Power Supply (RPS)	(0-30) V	1
2.	Voltmeter	(0-30V) MC	1
3.	Ammeter	(0-10mA) MC	1
4.	Resistor	470Ω, 560Ω 1KΩ	2, 1, 1
5.	Bread Board	-	1
6.	Multimeter	-	1

TABULAR COLUMN: 1

To measure I_L

V_i (volt)	I_L (amps)
10	286 mA

TABULAR COLUMN: 2

To measure R_{th} or R_N

From circuit diagram 2,

$R_{th} =$ 797 Ω

TABULAR COLUMN: 3

To measure V_{th} or V_{oc}

V_i (volts)	V_{th} (volts)
10	5V

MODEL CALCULATION:

Practical value of I_L (from tabulation) = 2.3 mA

verification of thevenin's theorem

$$I_L = V_{th} / (R_{th} + R_L) = 2.22\,mA$$

Theoretical calculation of I_L, R_{th} (R_N and V_{th} for the given circuit.

PROCEDURE:

1. Make the connections as per the circuit diagram : 1

2. Vary the RPS and set an input Voltage of 10V.

3. Note down the voltmeter reading (V_i) and ammeter reading (I_L) in Tabular column 1.

4. Switch off the supply and make connections for Circuit Diagram 2.

5. Measure the Thevenin's resistance R_{Th} = Norton's resistance R_N.

6. Switch off the supply and make connection for circuit diagram 3.

7. Set an input voltage of 10V in the RPS and note down the voltmeter readings V_i and V_{th} ($=V_{oc}$) in tabular columns : 3

8. switch off the supply and make connection for circuit diagram 4.

9. set an Input Voltage of 10V in the RPS and note down the voltmeter reading V_i and ammeter reading I_N ($=I_{sc}$) in tabular column 4.

CALCULATION:

By voltage division rule

$V_{th} = \frac{V_S \times R_3}{R_1 + R_3}$ [No current will flow through R_2 when R_2 is open circuited].

$V_{th} = \frac{10V \times 470\Omega}{(470+470)\Omega} = 5V$

$V_{th} = 5V$

R_{th}: R_1 and R_3 in parallel when voltage source is short circuited.

$R_{th} = \frac{470 \times 470}{470+470} + 560 = 255 + 560 = 795\Omega$

$R_{th} = 795\ \Omega$

Finding I_L:

R_{th} in series with R_L $\therefore$ $R_{eq} = R_L + R_{th}$
$= 1.795 K\Omega$

$I_L = \frac{V}{R_{eq}} = \frac{5V}{1.795 \times 10^3 \Omega} = 2.79mA.$

10. Draw the thevenin's equivalent circuit diagrams and Norton's equivalent circuit as shown in circuit.

11. Calculate the I_L value using the formula $I_L = V_{th} / (R_{th} + R_L)$

Norton's theorem

$$I_L = I_N * R_N / (R_N + R_L)$$

12. Theoretically verify the Norton's theorem.

RESULT:

Thus Thevenin's theorem is verified practically and theoretically.