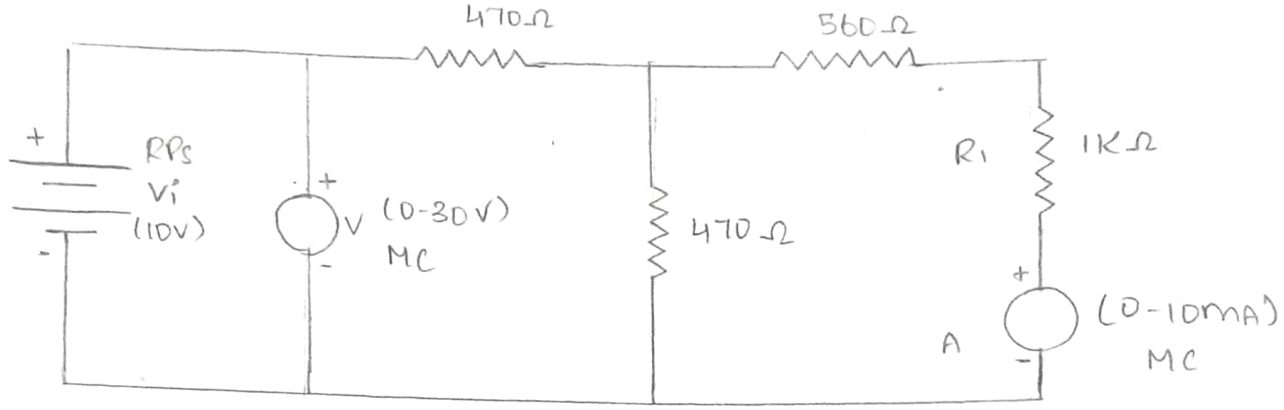
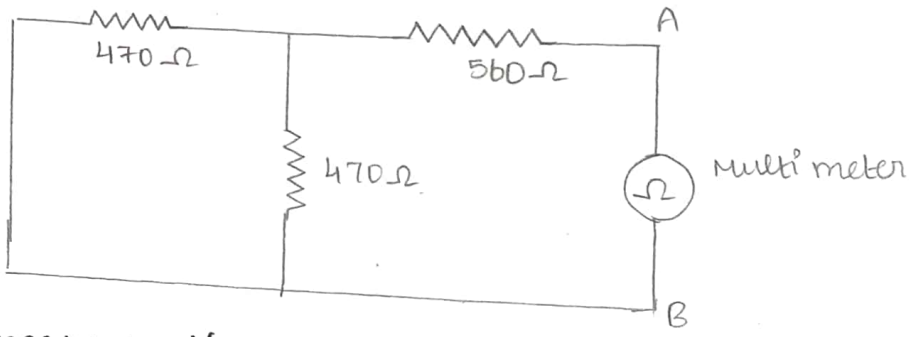
CIRCUIT DIAGRAM :-

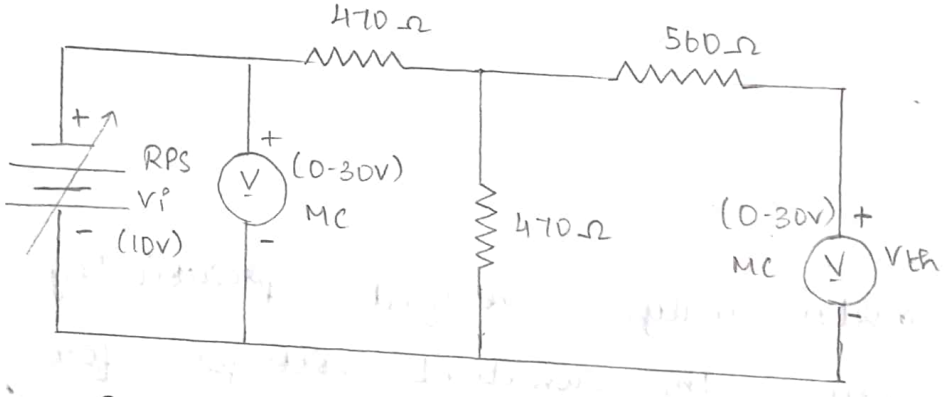
To measure I_L



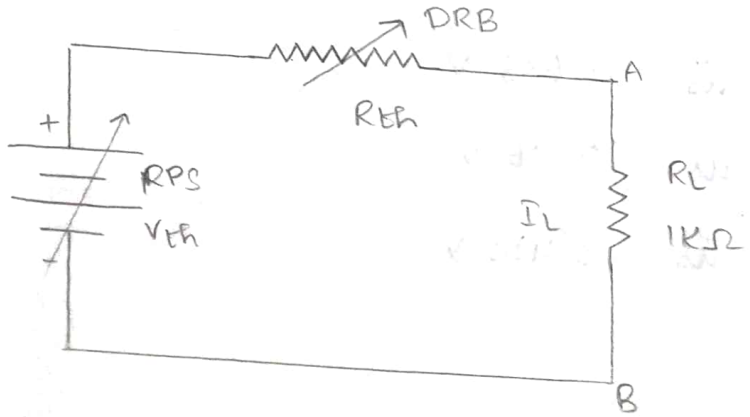
To measure R_{th} or R_N :



To measure V_{th} or V_{OC} :



Thevenin's equivalent circuit :-



VERIFICATION OF THEVENIN'S THEOREM.

AIM:

To verify Thevenins theorem practically and theoretically for the given DC circuit.

APPARATUS REQUIRED:

S.No	APPARATUS	SPECIFICATION	QUANTITY
1.	Regulated power supply (RPS)	(0-30V)	1
2.	Voltmeter	(0-30V)MC	1
3.	Ammeter	(0-10mA)MC	1
4.	Resistors.	470Ω, 560Ω, 1KΩ	2, 1, 1
5.	Bread Board.	–	1
6.	Multimeter	–	1

PROCEDURE:

1. Make connections as per in the circuit diagram.
2. Vary the RPS and set an input voltage of 10V
3. Note down the voltmeter reading (Vi) and ammeter reading (IL) in Tabular column 1.
4. Switch off the supply and make connections for circuit Diagram 2.
5. Measure the thevenins resistance R_{th} = Norton resistance R_N.

TABULAR COLUMN : 1

TO measure I_L.

V_1 (volt)	I_L (amps)
10	2.86 mA

TABULAR COLUMN : 2

TO measure R_{th} or R_N:

From the circuit diagram 2,

$R_{th} = R_N = 795\ \Omega$

TABULAR COLUMN : 3

TO measure V_{th} or V_{oc}.

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

MODEL CALCULATION:

Practical value of I_1 (from tabulation) = 2.3 mA

verification of thevenin's theorem.

$IL = V_{th} / (R_{th} + R_L) = 2.22$ mA.

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

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

7. Set an input voltage of 10V in the RPS and note down the voltmeter readings Vi and V_{Th} ($=V_{OC}$) in tabular column : 3.

8. Switch off the supply and make connections for circuit diagram : 3.

9. Set an input voltage of 10V in the RPS and note down the voltmeter reading Vi and Ammeter reading IN ($= I_{SC}$) in Tabular column 4.

10. Draw the thevenin's equivalent circuit and Norton's equivalent circuit as shown in circuit diagram 5 & 6 respectively.

11. Calculate the I_L value using the formula.

Therenin's theorem.

$$I_L = \frac{V_{Th}}{[R_{Th} + R_L]}$$

Norton's theorem.

$$I_L = \frac{I_N * R_N}{[R_N + R_L]}$$

12. Theoretically verify the Norton's theorem.

CALCULATION:

By voltage division rule,

$$V_{th} = \frac{V_S \times R_3}{R_1 + R_3}$$ [No current will flow through R2 when R2 is open circuited]

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

$$V_{th} = 5V$$

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

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

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

$$I_L = 2.79\ mA.$$

RESULT :

Thus thevenin's theorem is verified practically and theoretically.