Expt. No. 01 Page No. _____

1 Objective :-

To familarize with measuring and testing equipments like multimeter, CRO, Function Generator, Power supply, etc and also familarize with bread board, resistors and capacitors, etc. Calculate the resistance value a/c to colour band & then verify with multimeter.

2 Observation Table :-

S.No	Resistor	Colour Band	Calculated value (in kOhm)	Measured value (in kOhm
1	R_1	Green Red Red Gold	$= 82 \times 10^2 \pm 5\%$ $= 8.2\ k\Omega$	$= 8.09\ k\Omega$
2	R_2	Yellow Violet Orange Gold	$= 47 \times 10^3 \pm 5\%$ $= 47\ k\Omega$	$= 46 k\Omega$
3	R_3	White Red Blue Gold	$= 92 \times 10^1 \pm 5\%$ $= 0.92\ k\Omega$	$= 0.8\ k\Omega$
4	R_4	Red Red Orange Gold	$= 22 \times 10^3 \pm 5$ $= 22\ k\Omega$	$= 21.6\ k\Omega$

Teacher's Signature _____

Expt. No. 02 (A) Page No.

1) Aim :- To verify the kirchhoffs current law (KCL).

2) Objective :- To objective of this lab activity is to verify kirchho-ff's current law using mesh and nodal analysis.

3) Theory :- A/c to KCL, in any network of wires carrying currents, the algebraic sum of all current meeting at a junction is zero.

S.No	Equipment	Specification	Quantity
1	Regular power DC supply	0 - 24 V	1
2	PMMC Ammeter	0 - 1 A	3
3	Resistances / Rheostats		4
4	connecting wires		

4) Procedure :- Four resistance R_1, R_2, R_3 and R_4 & ammeter A_1, A_2 and A_3 are connected to DC battery or regulated DC power supply as shown in figure.

5) Working principle :- The algebraic sum of current in a network of conductors meeting at a point is zero. This principle can be stated that :-

$$\sum_{k=1}^{N} I_k = 0$$

6) Key Parameter :- Let $R_1 = 220\Omega$, $R_2 = 1k\Omega$, $R_3 = 330\Omega$, $R_4 = 330\Omega$ and also calculate :- error = $\frac{\text{Actual} - \text{Measured}}{\text{Actual}} \times 100$

7) Experimental Results :-

a) Calculate the ideal voltages and current for each elemen inthe circuit & compare them to the measured value

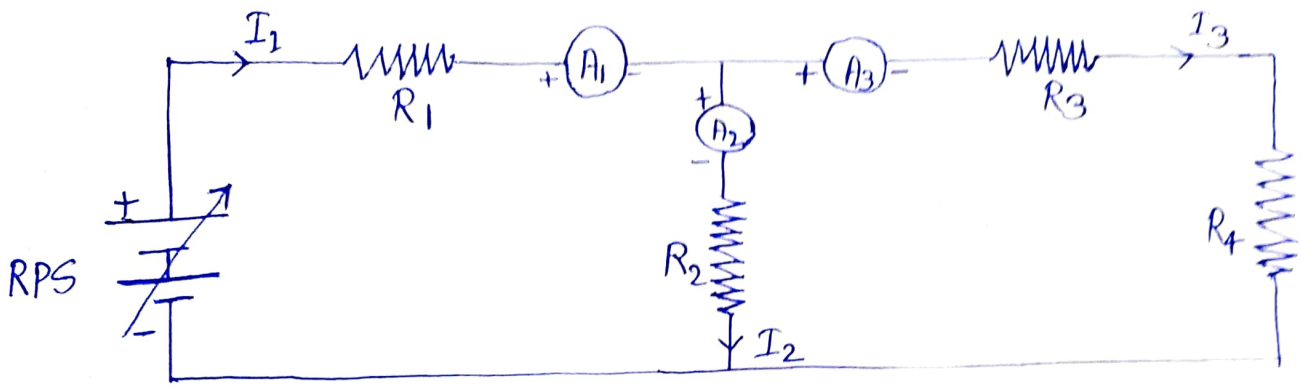
b) Compute the percentage error inthe two measurements.

8) Precautions :-

- All connections should be tight.
- Reading & calculation should be taken carefully.
- Don't touch the live terminals.

Teacher's Signature

✳ Circuit Diagram:-



5) Observations:-

S.No	Reading of Ammeter A_1 (I_1)	Reading of Ammeter A_2 (I_2)	Reading of Ammeter A_3 (I_3)	$I_2 + I_3$
1	0.747	0.271	0.474	0.74
2	1.98	0.344	0.696	1.095

1) Aim :- To verify the kirchhoff's voltage law (KVL).

2) Objective :- The objective of this lab to verify KVL using mesh and nodal analysis of the given circuit.

3) Theory :- A/c to KVL, in any closed circuit or mesh, the algebraic sum of emf acting in the circuit or mesh is equal to the algebraic sum of the products of currents & resistance of each part of the circuit or mesh.

4) Apparatus Required :-

S.No	Equipment	Specification	Quantity
1	Regulated power DC supply	0 – 24 V	1
2	PMMC Voltmeter	0 – 24 V	4
3	Resistances		4
4	Connecting wires		

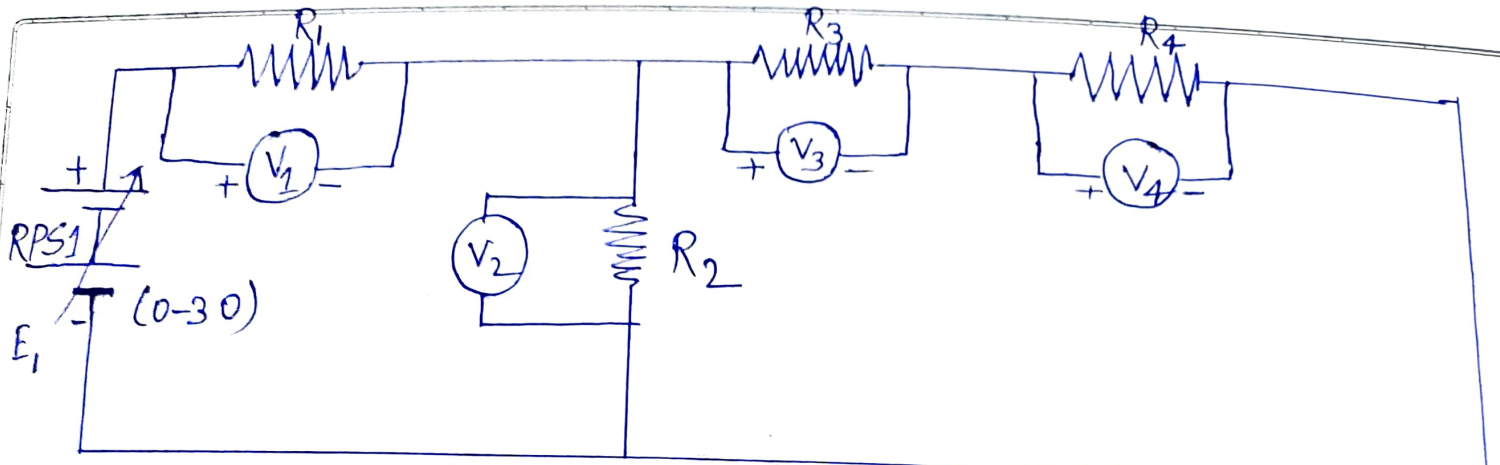
6) Procedure :- Resistances R_1, R_2, R_3 & R_4 & Voltmeter V_1, V_2, V_3 & V_4 are connected to DC battery as shown in figure. Three rheostat are set their maximum values, supply is switched on and the reading of the voltmeters V_1, V_2, V_3 & V_4 is noted. The process may be repeated by varying either of resistances R_1, R_2, R_3 & R_4

7) Working principle :- The sum of the emf's in any closed loop is equivalent to the sum of the potential drop in that loop. Similar to kcl, it can be stated as :-

$$\sum_{k=1}^{N} V_k = 0$$

* Key parameters :- Let $R_1 = 220\,\Omega$, $R_2 = 1\,k\Omega$, $R_3 = 330\,\Omega$, $R_4 = 330\,\Omega$ and also calculate the error $= \frac{\text{Actual} - \text{Measured}}{\text{Actual}} \times 100$

Teacher's Signature



KVL Circuit Diagram

S.No	Reading of Voltmeter V_1	Reading of Voltmeter V_2	Reading of Voltmeter V_3	Reading of voltmeter V_4	$V = V_1 + V_2$	$V_2 = V_3$
1	7.42	2.74	0.47	2.213	10.14	2.74
2	10.44	4	0.69	3.31	14.44	4

Date _____

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8) Experiment Result :-

a) Calculate the ideal voltages and currents for each element in the circuit and compare them to the measured values.

b) Compute the percentage error in the two measurement and provide a brief explanation for the error.

9) Precautions :-

i) All connection should be tight.

ii) All steps should be followed carefully.

iii) Reading and calculations should be taken carefully

iv) Don't touch the five terminals.

Date _____

Expt. No. 03 Page No. _____

1) Aim :- To verify the Norton's Theorem.

2) Apparatus Required :-

S.No	Equipment	Specification	Quantity
1	Two regulated DC power supply	0-12V & 0-5A	1
2	PMMC Voltmeter	0-10V	1
3	PMMC Ammeter	0-5A	1
4	Resistances/Rheostats		4/1
5	Connecting wires		

3) Brief Theory :- According to this theory if a resistor of RL ohms be connected between any two terminals of a linear bilateral network, then the resulting current through load resistors will be equal to $\frac{R_{TH} I_{sc}}{R_L + R_{TH}}$ where Isc is the short circuit current through load terminal points & $R_N = R_{TH}$ is the resistance of network measured between these two points.

5) Procedure :-

(i) Remove the resistance

(ii) Find the short circuit current Isc which flow through two load terminals from where resistance is removed

(iii) Compute the resistance of whole network as looked into from these two terminals after all sources of emf are treated as shosted

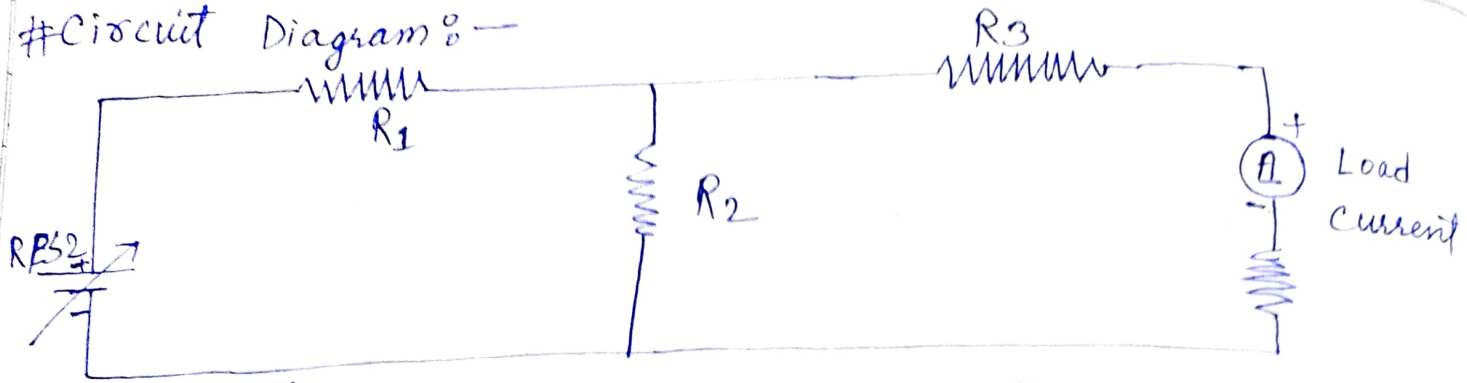
(v) Finally, calculate the current following through RL $= I_1 = \frac{R_{TH} I_{sc}}{R_L + R_{TH}}$

6) Observation :-

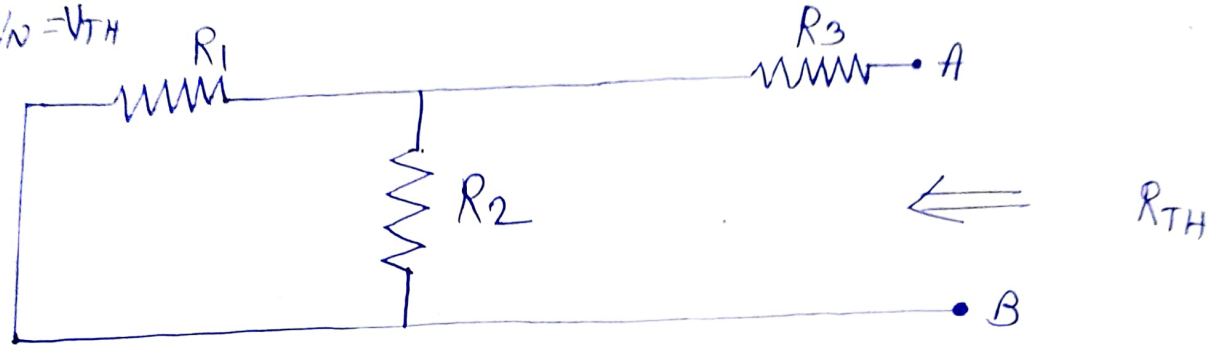
S.No	Short circuited current through load terminal Isc	Req across the Load RL terminals, R_{TH}	$I_L = \frac{R_{TH} I_{sc}}{R_L + R_{TH}}$	% error ~~Measured I_L~~
1	0.42	9.48	0.401	2.69
2	0.59	9.63	0.59	3.38

Teacher's Signature _____

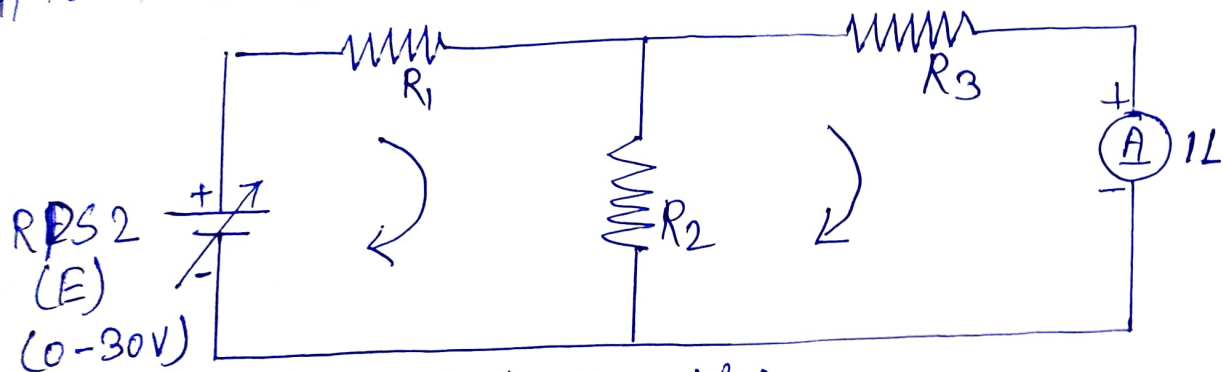
#Circuit Diagram :-



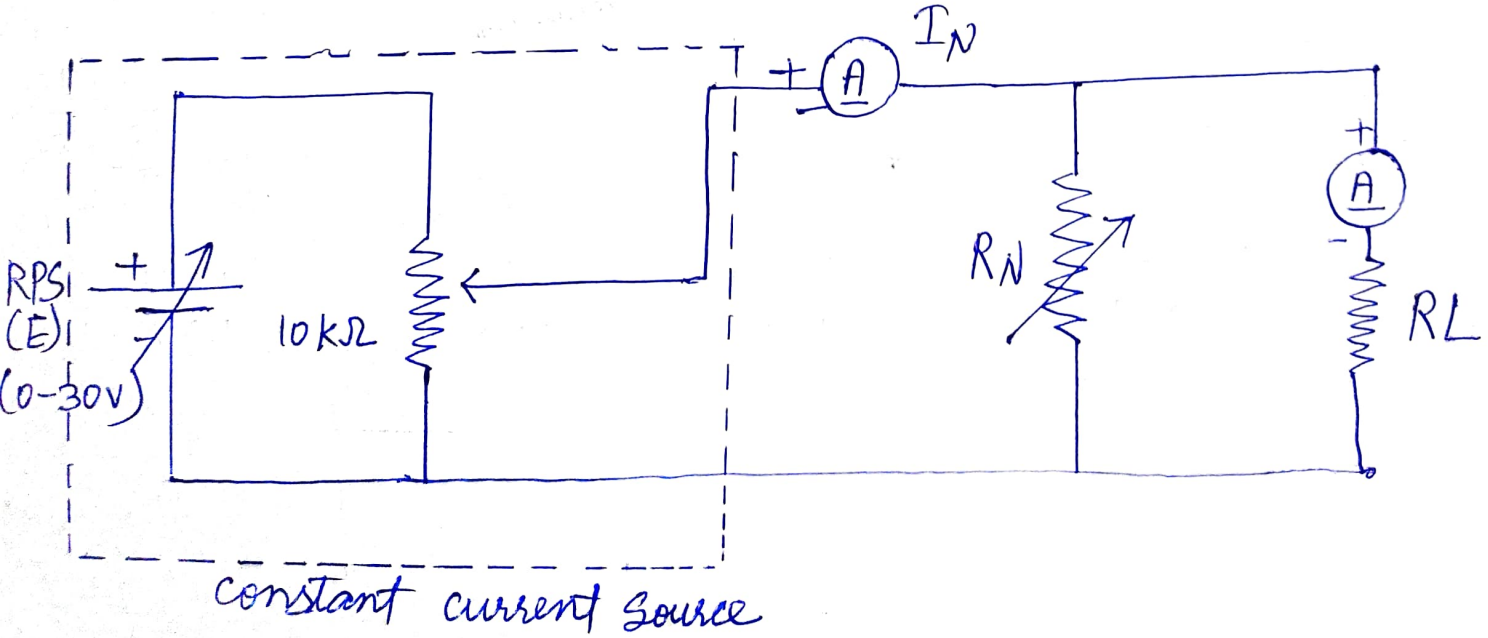
#To find $V_N = V_{TH}$



#To find Isc



#Norton's Equivalent circuit :-



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7) Result and Discussion :—

i) The value of short circuit current I_{sc} is I ------ Amp.

ii) The value of Norton's resistance is _____ ohms.

iii) It will be found that measured value of current flowing through the load IL is the same as determined by Norton's Theorem

8) Outcomes :—

Students are able to analyze Norton's theorem in resistive circuit.

9) Precautions :—

All connection should be tight.

All steps should be followed properly.

Reading & calculation should be taken carefully.

Don't touch the live terminals.

Expt. No. 04 Date

Page No.

1) Aim:- To verify the Thevenin's Theorem:

2) Apparatus Required:-

S. No	Equipment	Specification	Quantity
1	Two Regulated DC power supply	~~0-12V & 0-6V~~ 0-12V & 0-6V	1
2	PMMC Voltmeter	0-10V	1
3	PMMC Ammeter	0-5A	1
4	Resistances / Rheostats		4/1
5	Connecting wire		

3) Brief theory:- A/c to this theorem if a resistor of R_L ohms be connected b/w any two terminals of a linear bilateral network, then the resulting current through the load resister will be equal to $\frac{V_{TH}}{R_L + R_{TH}}$ where V_{TH} is the P.d across these two points & R_{TH} is the resistance of network measured b/w two points. V_{TH} is the Open Circuit voltage across the terminals, R_{TH} is the equivalent resistance across the terminals, R_L is the load resistance.

5) Procedure:-

a) Remove the resistance (called Load Resistance R_L).

b) Find the Open circuit voltage V_{OC} which appears across the two terminals from where resistance is removed. It is called thevenin's voltage

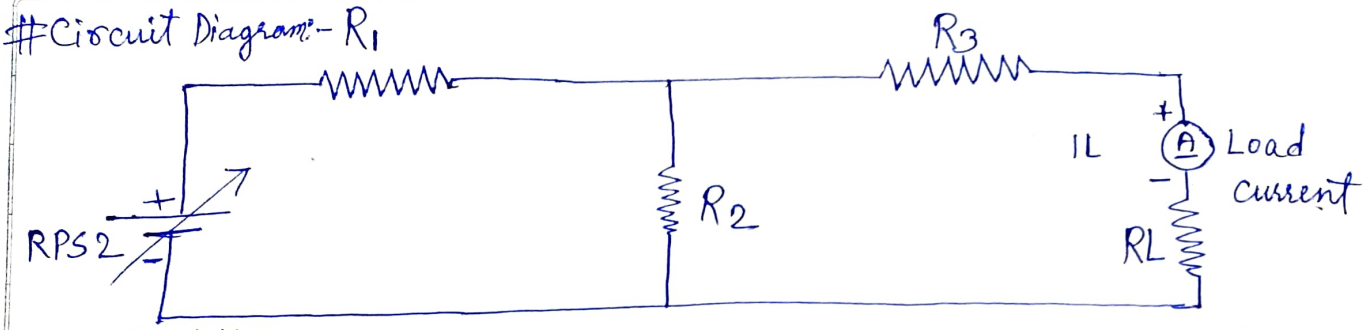
c) Finally, calculate the current flowing through R_L using eqn $= \frac{V_{TH}}{R_L + R_{TH}}$

6) Observation:-

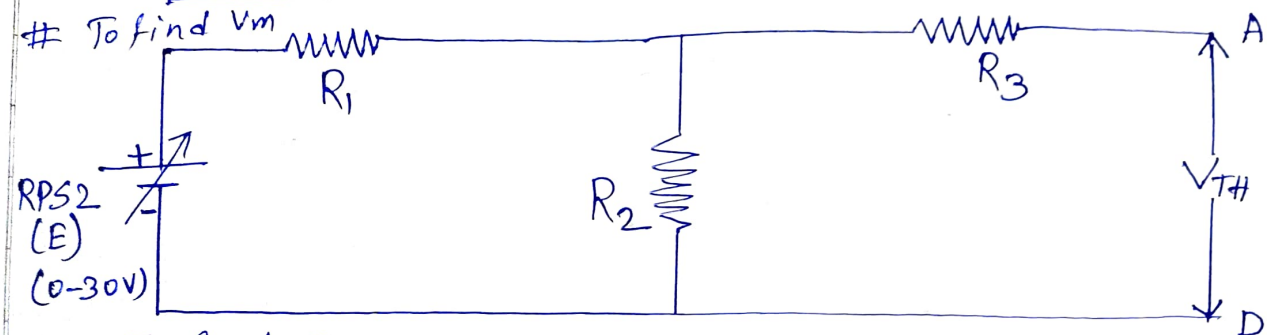
S. No	Open circuit voltage across Load R_L terminals (V_{OC})	Req across the load R_L terminals R_{TH}	Load current $I_L = \frac{V_{TH}}{R_L + R_{TH}}$	Measured I_L
(1)	9.2	130.5	~~15~~ 17.61	15.8

Teacher's Signature

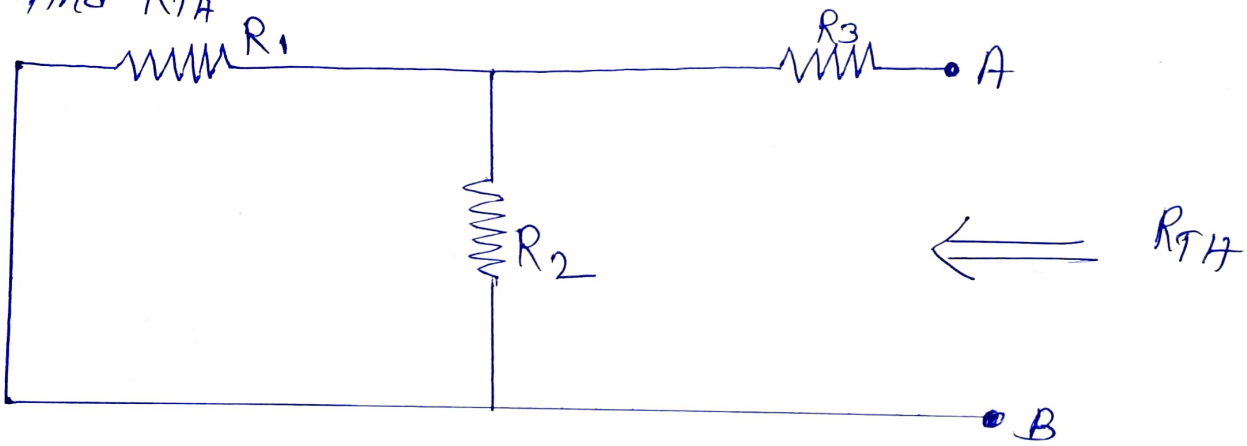
#Circuit Diagram:-



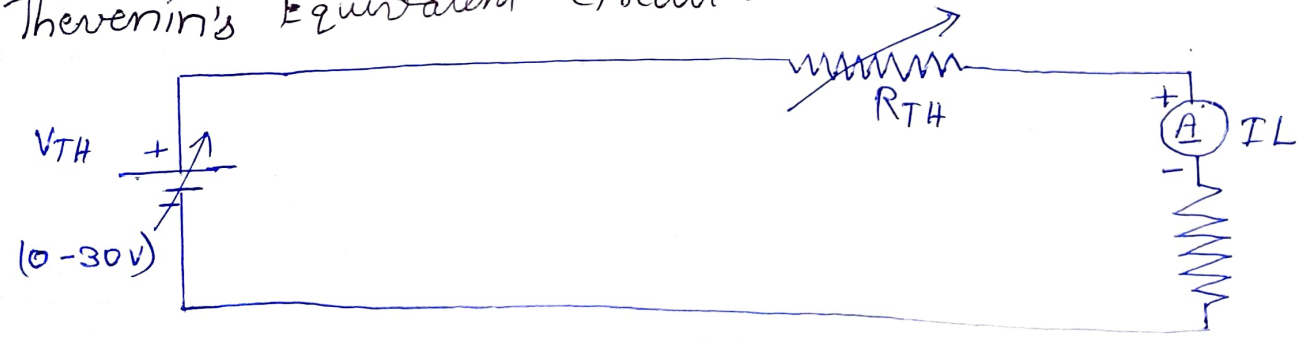
To find Vm



To find R_{TH}



Thevenin's Equivalent circuit:-



Expt. No. 04

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7) Result and Discussion:-

a) The value of open circuit voltage (VOC) is ..... volts.
b) The value of Thevenin's resistance is ..... ohms.
c) The value of current acrossload is ..... amps.
d) It will found that measured value of current flowing Through the load I_L is the same as determined by Thevenin's Theorem.

8) Outcomes:-

Students are able to analyze Thevenin theorem in presence of DC source.

9) Precautions:-

a) All connection should be tight.
b) All steps should be followed carefully.
c) Reading and calculations should be taken carefully.
d) Dont touch the live terminals.