DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY, Kattankulathur – 603 203

Title of Experiment	:	**2. VERIFICATION OF ALL THEOREMS- (THEVENIN, NORTON, MAXIMUM POWER TRANSFER)**
Name of the candidate	:	
Register Number	:	
Date of Experiment	:	

Sl. No.	Marks Split up	Maximum marks (50)	Marks obtained
1	Pre Lab questions	5	
2	Preparation of observation	15	
3	Execution of experiment	15	
4	Calculation / Evaluation of Result	10	
5	Post Lab questions	5	
Total		**50**	

Staff Signature

PRE LAB QUESTIONS

1. Define Lumped and distributed elements.

2. State Thevenin's theorem?

3. State Norton's theorem?

4. List the applications of Thevenin's and Norton's theorems?

5. What are the different types of dependent or controlled sources?

Experiment No. 2 a) **Date :**	**THEVENIN'S THEOREM**

Aim:

To verify Thevenin's theorem and to find the full load current for the given circuit.

Apparatus Required:

Sl.No.	Apparatus	Range	Quantity
1	RPS (regulated power supply)	(0-30V)	2
2	Ammeter	(0-10mA)	1
3	Resistors	1KΩ, 330Ω	3,1
4	Bread Board	--	Required
5	DRB	--	1

Statement:

Any linear bilateral, active two terminal network can be replaced by a equivalent voltage source (V_{TH}). Thevenin's voltage or V_{OC} in series with looking pack resistance R_{TH}.

Precautions:

1. Voltage control knob of RPS should be kept at minimum position.
2. Current control knob of RPS should be kept at maximum position

Procedure:

1. Connections are given as per the circuit diagram.
2. Set a particular value of voltage using RPS and note down the corresponding ammeter readings.

To find V_{TH}

3. Remove the load resistance and measure the open circuit voltage using multimeter (V_{TH}).

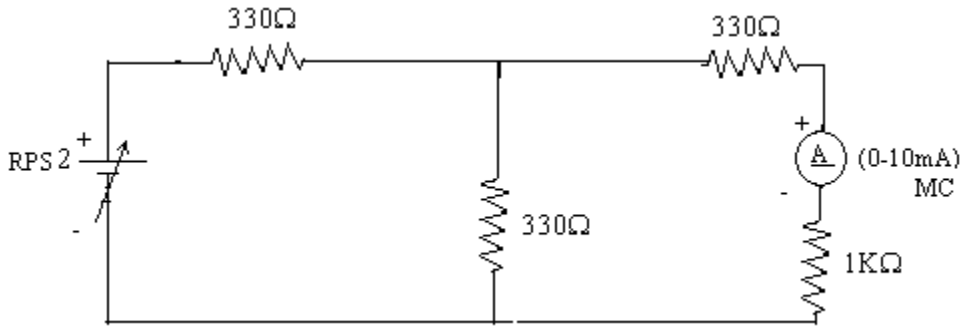
To find R_{TH}

4. To find the Thevenin's resistance, remove the RPS and short circuit it and find the R_{TH} using multimeter.
5. Give the connections for equivalent circuit and set V_{TH} and R_{TH} and note the corresponding ammeter reading.
6. Verify Thevenins theorem.

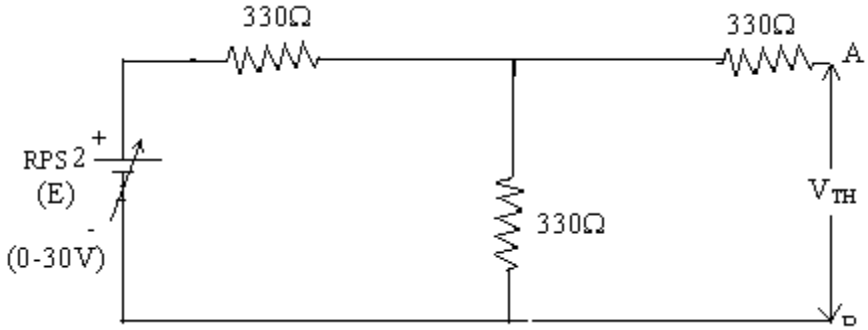
Theoretical and Practical Values

	E(V)	V_{TH}(V)	R_{TH}(Ω)	I_L (mA)	
				Circuit - I	Equivalent Circuit
Theoretical					
Practical					

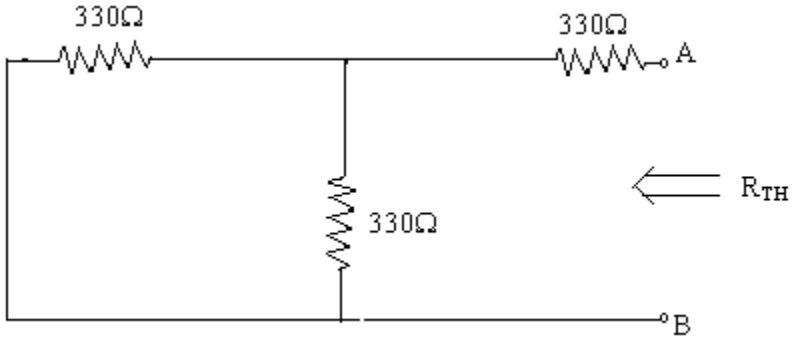
Circuit - 1 : To find load current



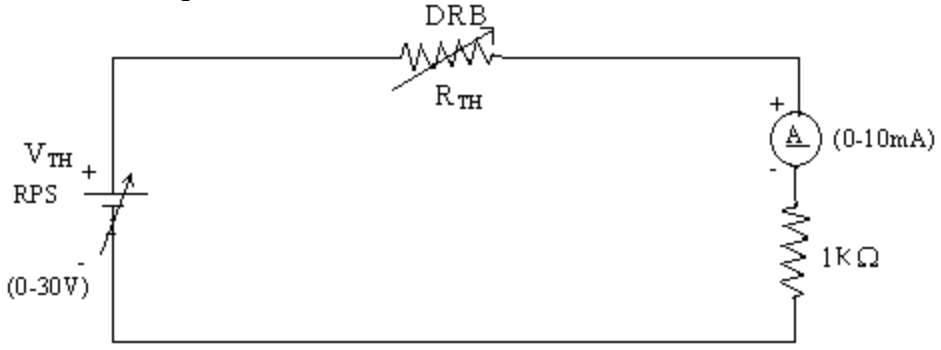
To find V_{TH}



To find R_{TH}



Thevenin's Equivalent circuit:



Model Calculations:

Result:

Experiment No. 2 b) Date :	VERIFICATION OF NORTON'S THEOREM

Aim:

To verify Norton's theorem for the given circuit.

Apparatus Required:

Sl.No.	Apparatus	Range	Quantity
1	Ammeter	(0-10mA) MC (0-30mA) MC	1 1
2	Resistors	330, 1KΩ	3,1
3	RPS	(0-30V)	2
4	Bread Board	--	1
5	Wires	--	Required

Statement:

Any linear, bilateral, active two terminal network can be replaced by an equivalent current source (I_N) in parallel with Norton's resistance (R_N)

Precautions:

1. Voltage control knob of RPS should be kept at minimum position.
2. Current control knob of RPS should be kept at maximum position.

Procedure:

1. Connections are given as per circuit diagram.
2. Set a particular value in RPS and note down the ammeter readings in the original circuit.

To Find I_N:

3. Remove the load resistance and short circuit the terminals.
4. For the same RPS voltage note down the ammeter readings.

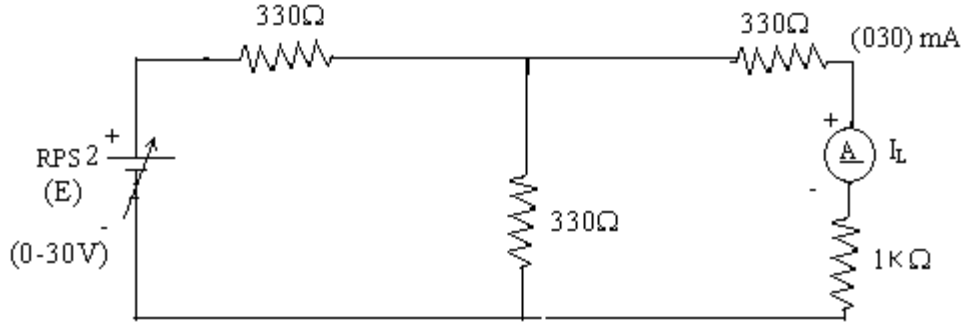
To Find R_N:

5. Remove RPS and short circuit the terminal and remove the load and note down the resistance across the two terminals.

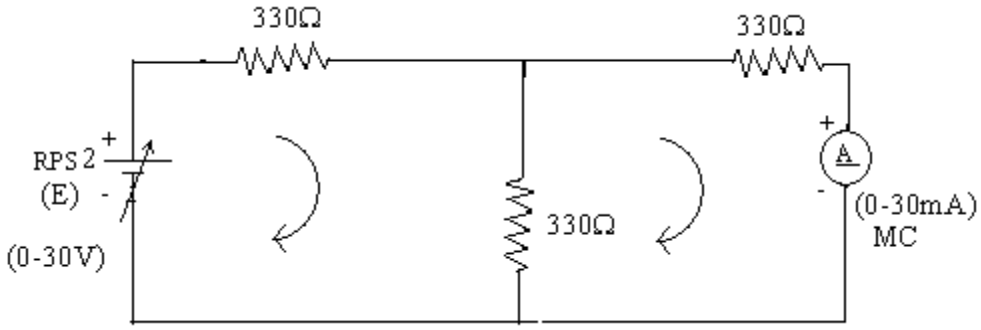
Equivalent Circuit:

6. Set I_N and R_N and note down the ammeter readings.
7. Verify Norton's theorem.

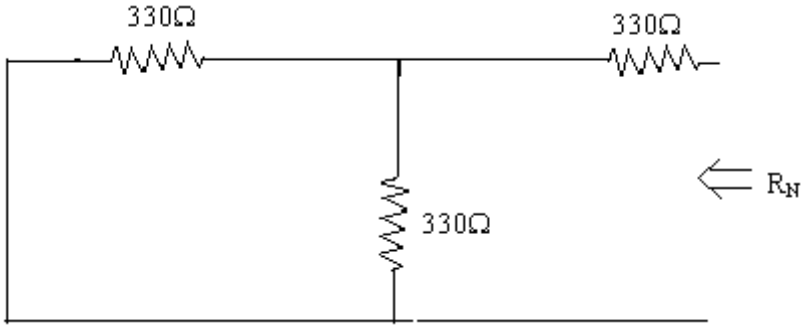
To find load current in circuit 1:



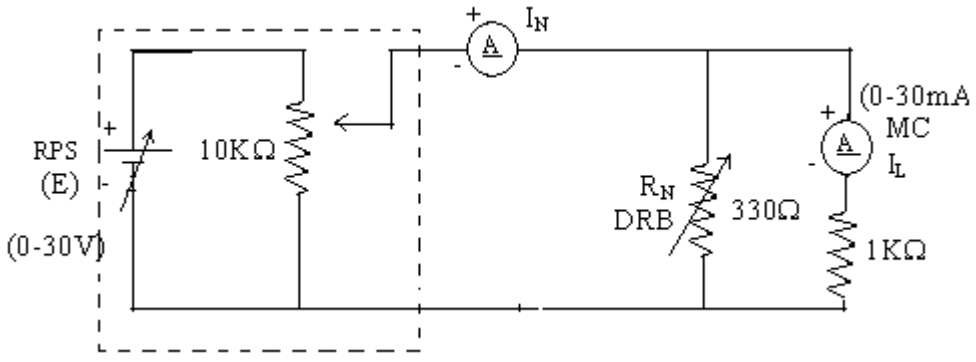
To find I_N



To find R_N



Norton's equivalent circuit



Constant current source

Theoretical and Practical Values

	E (volts)	I_N (mA)	R_N (Ω)	I_L (mA)	
				Circuit - I	Equivalent Circuit
Theoretical Values					
Practical Values					

Model Calculations:

Result:

Experiment No. 2 c) Date :	VERIFICATION OF MAXIMUM POWER TRANSFER THEOREM

Aim:

To verify maximum power transfer theorem for the given circuit

Apparatus Required:

Sl.No.	Apparatus	Range	Quantity
1	RPS	(0-30V)	1
2	Voltmeter	(0-10V) MC	1
3	Resistor	1KΩ, 1.3KΩ, 3Ω	3
4	DRB	--	1
5	Bread Board & wires	--	Required

Statement:

In a linear, bilateral circuit the maximum power will be transferred from source to the load when load resistance is equal to source resistance.

Precautions:

1. Voltage control knob of RPS should be kept at minimum position.
2. Current control knob of RPS should be kept at maximum position.

Procedure:

Circuit – I

1. Connections are given as per the diagram and set a particular voltage in RPS.
2. Vary R_L and note down the corresponding ammeter and voltmeter reading.
3. Repeat the procedure for different values of R_L & Tabulate it.
4. Calculate the power for each value of R_L.

To find V_{TH}:

5. Remove the load, and determine the open circuit voltage using multimeter (V_{TH})

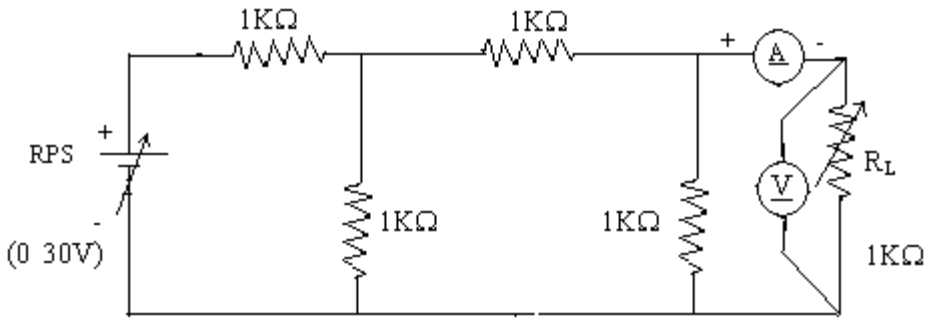
To find R_{TH}:

6. Remove the load and short circuit the voltage source (RPS).
7. Find the looking back resistance (R_{TH}) using multimeter.

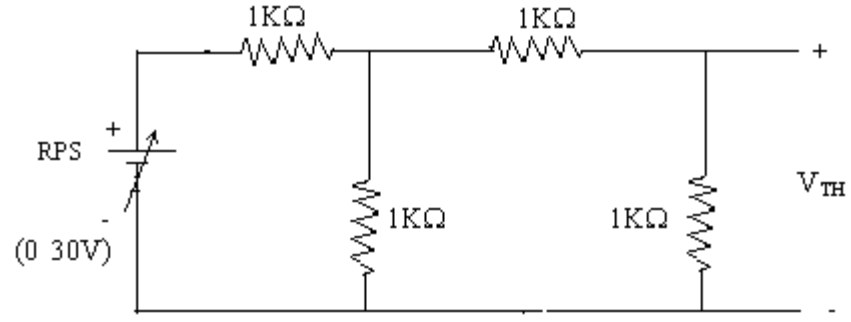
Equivalent Circuit:

8. Set V_{TH} using RPS and R_{TH} using DRB and note down the ammeter reading.
9. Calculate the power delivered to the load ($R_L = R_{TH}$)
10. Verify maximum transfer theorem.

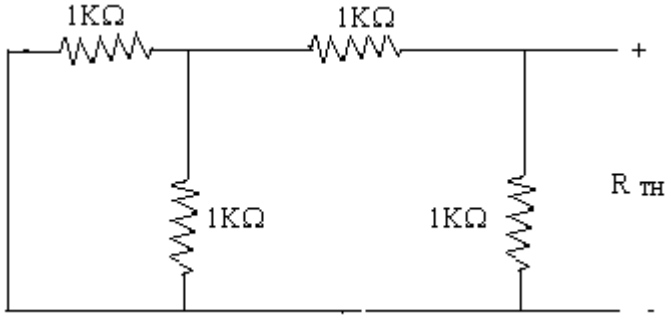
Circuit - 1



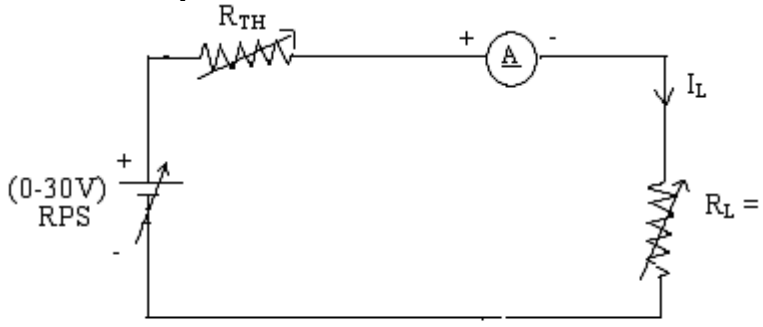
To find V_{TH}



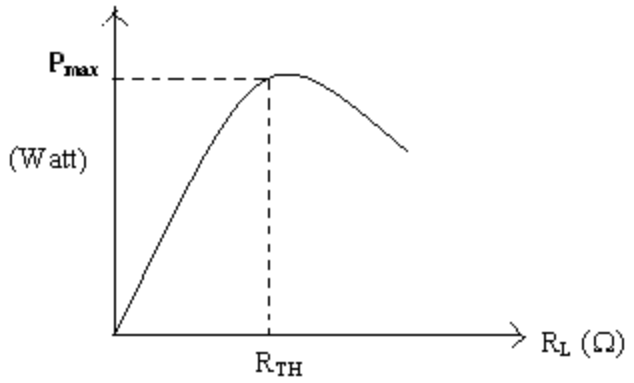
To find R_{TH}



Thevenin's Equation Circuit



Power V_S R_L



Circuit – I

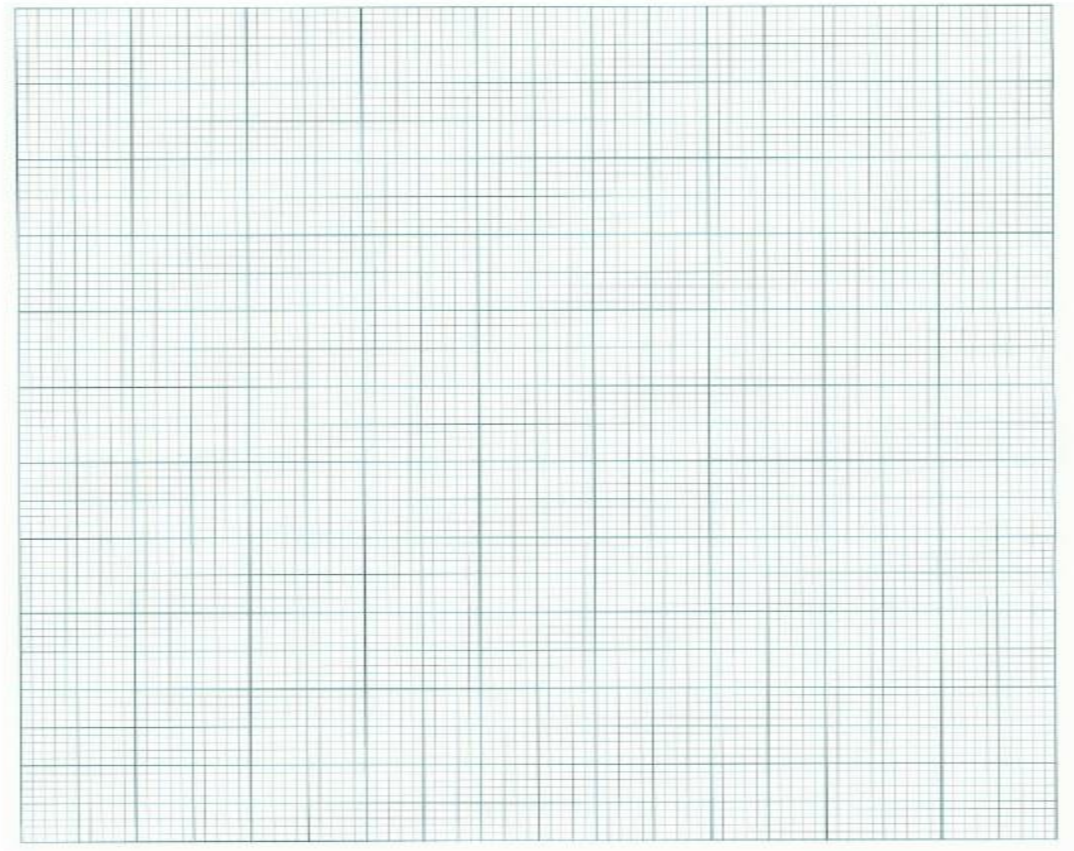
Sl.No.	RL (Ω)	I (mA)	V(V)	P=VI (watts)

To find Thevenin's equivalent circuit

	V_{TH} (V)	R_{TH} (Ω)	I_L (mA)	P (milli watts)
Theoretical Value				
Practical Value				

Model Calculations:

GRAPH:



Result:

POST LAB QUESTIONS

1. **State Thevenin's Theorem.**

2. **Draw the Thevenin's equivalent circuit**

3. **State maximum power transfer theorem.**

4. **Write some applications of maximum transfer theorem.**

5. **Write the steps to find I_N**

6. **What are the steps to solve Maximum power transfer Theorem?**