Verification of Maximum Power Transfer Theorem

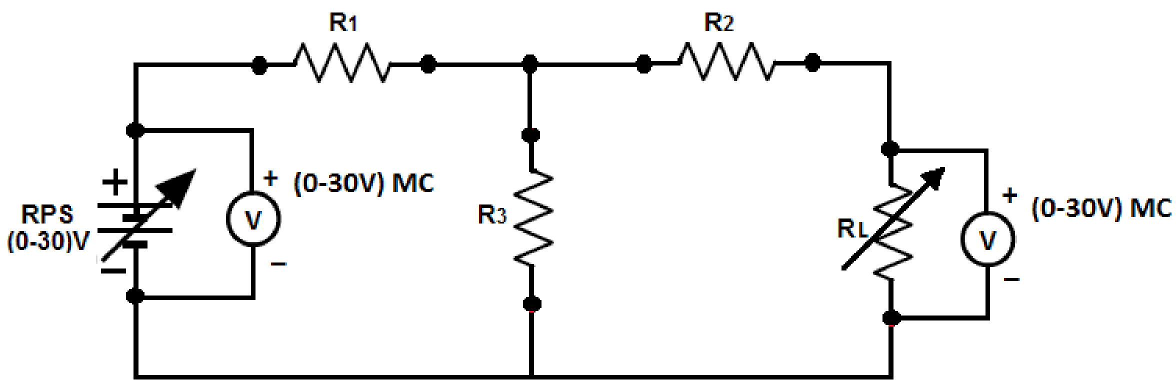
Exp. No: **Date:**

Aim: To verify maximum power transfer theorem for the given circuit

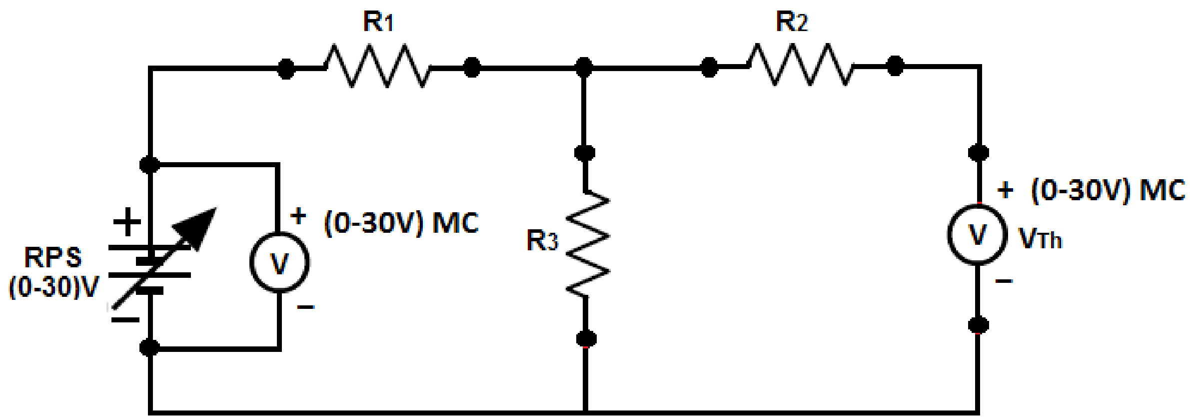
Apparatus Required:

S.No	Name of the equipment	Range/ Specification	Type	Quantity
1	Voltmeter	(0-200mV),	MC	1
2	Resistors		Carbon composite	4
3	RPS	(0-30V),2A	--	1
4	Bread board		--	1
5	Connecting wires	1/22 Single Stranded conductor	Copper	Adequate

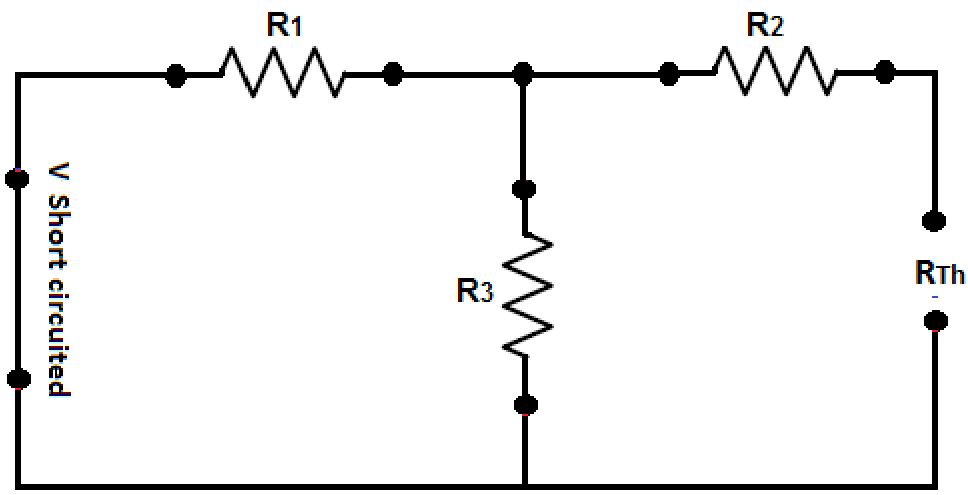
Circuit Diagram:



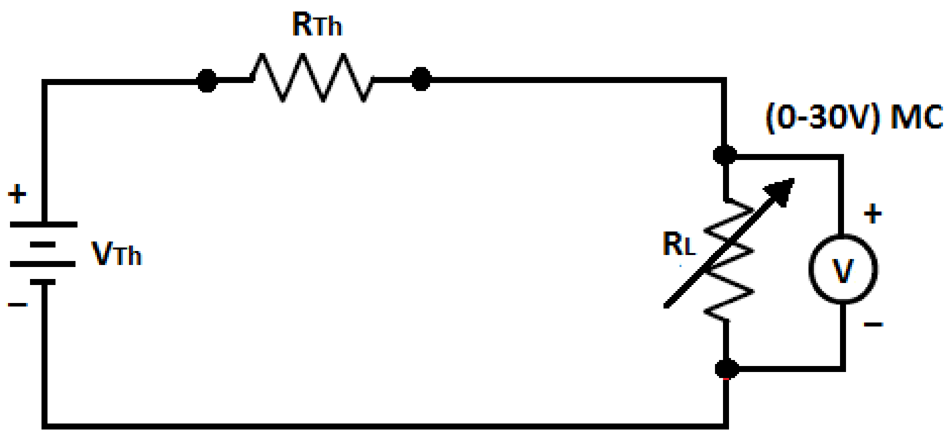
Circuit diagram for Load voltage (V_L)



Circuit diagram for Open circuit Voltage V_{Th}



Circuit diagram for R_{Th}



Equivalent circuit diagram

Tabular column:

S.No	V (Volts)	R (Ohms)	$P=V^2/R$ (Watts)

Procedure:

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

To find Vth:

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

To find Rth:

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 RTh and note down the voltmeter reading.
9. Calculate the power delivered to the load ($R_L = R_{Th}$)
10. Verify maximum transfer theorem.

Theoretical calculation:

$$V_{Th} = I\,R_3$$

- *I is the circuit current when R_L is removed*

$$I = \frac{V}{R_1+R_2}$$

- *V_{Th} is the drop across R_3 when R_L is removed*

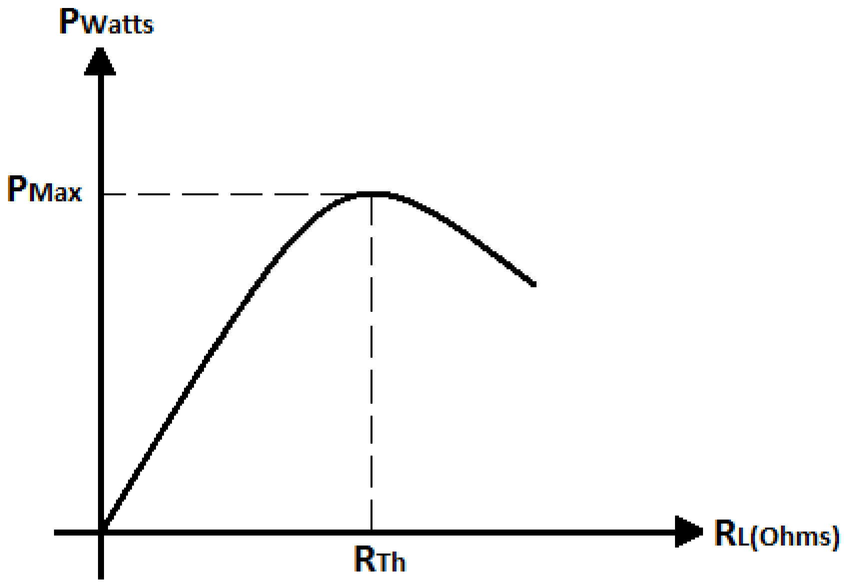
$$R_{Th} = (R_1 \,//\, R_3) + R_2 \text{ (OR) } R_{Th} = V_{Th} / I_{SC}$$

$$I_{SC} = \frac{V_{Th}}{R_{Th}}$$

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

$$\text{Power} \quad P = I^2 R_L \quad \text{OR} \quad P = \frac{V^2}{R_L}$$

Model graph:



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.

Result: