Exp No.	Title	Date
S2	**Verification of Maximum Power transfer theorem**	**11 Sept 2019**

Objective:

- To prove Maximum Power Transfer theorem using PSPICE software.

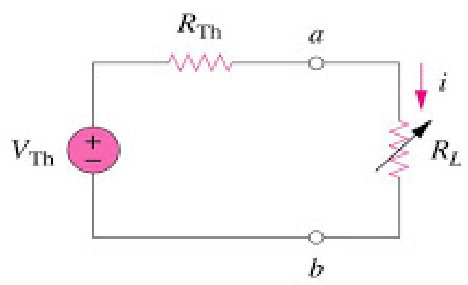
Apparatus/Tool required:

ORCAD / Capture CIS □ Analog Library – R,
Source Library – Vdc, Idc
Ground (GND) – 0 (zero)

Simulation Settings:

Analysis Type – Bias Point

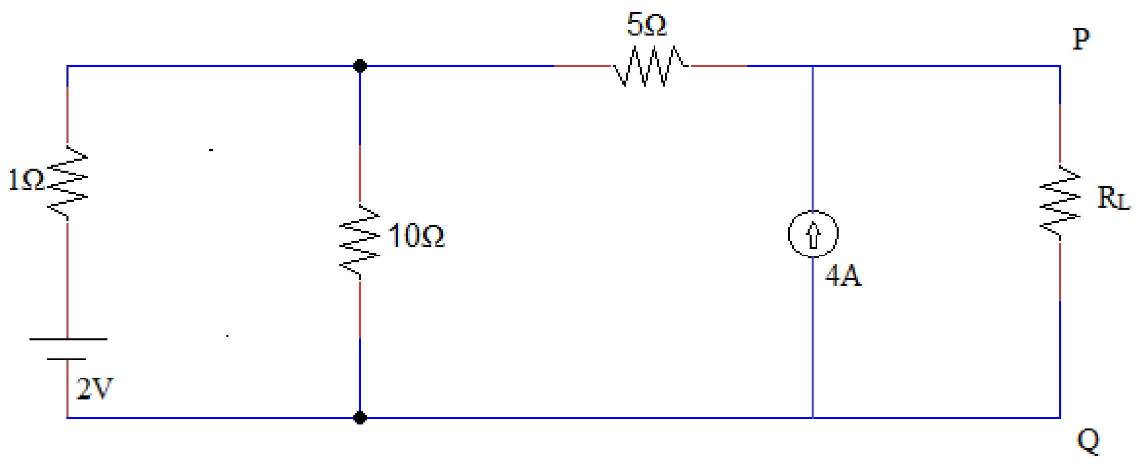
Theory:



Maximum Power Transfer Theorem states that "maximum power is transferred from the source to the load when the load resistance is equal to the Thevenin's equivalent resistance."

In short, $R_L = R_{Th}$

Circuit Diagram:

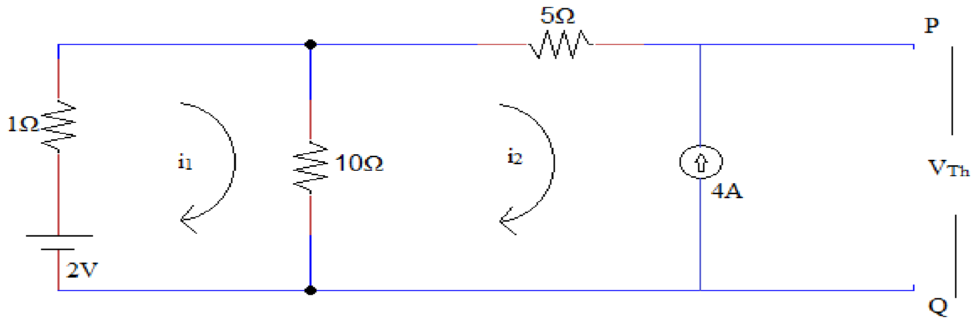


Procedure:

1. Create the given circuit diagram in new project file using the general procedure.
2. Replace the default component value and source value as per given circuit diagram.
3. Create the New simulation profile and set analysis type as Bias point.
4. Run the simulation and note down the readings in tabulation.
5. Compare the simulated results with solved values.

Calculations:

1)



Here, i_2 = -4 A

In loop (1)

$2 - i_1 - (10) * (i_1) + (10) * (i_2) = 0$

$2 - (11) * (i_1) + (10) * (-4) = 0$

$2 - (11) * (i_1) - 40 = 0$

$(11) * (i_1) = -38$

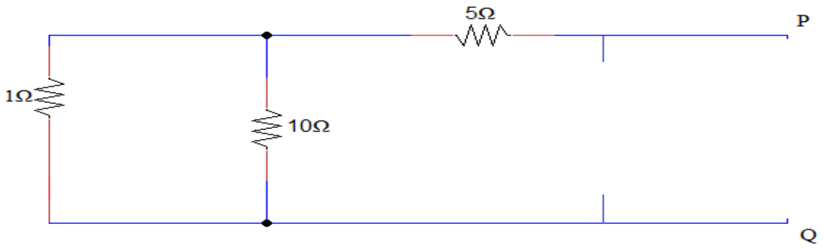
$(i_1) = -3.455$ A

$V_{Th} = (10) * (i_1 - i_2) - (5) * (i_2)$

$= (10) * (-3.455 + 4) - (-20)$

$= 25.45$ V

2)



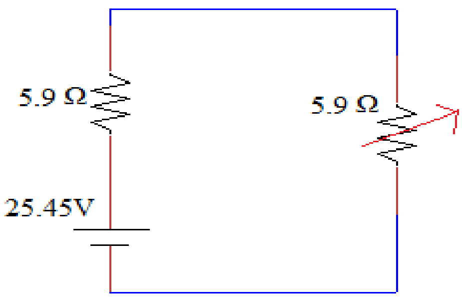
$R_{Th} = 1\|10 + 5$

$= (1 * 10) / (11) + 5$

$= ((65) / (11))\ \Omega$

$= 5.9\ \Omega$

3)



For Maximum Power,

$R_L = R_{Th}$

$I_L = (V_L) / (R_{Th} + R_L)$

$= (25.45) / (5.9 + 5.9)$

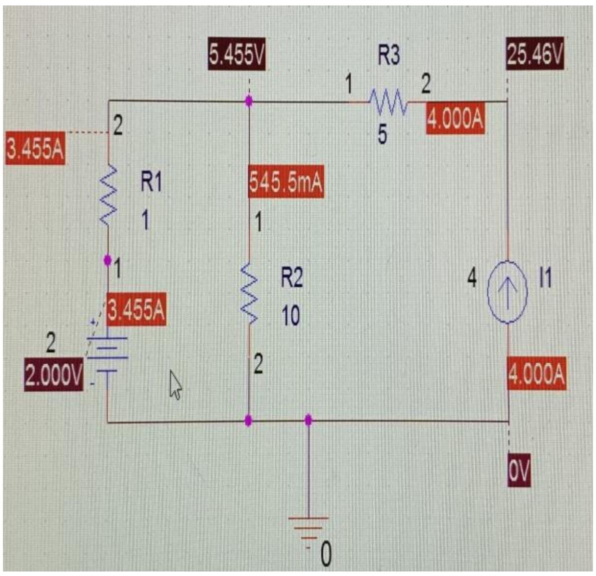
$= 2.156\ A$

$P_{Max} = I_L^2 * R_L$

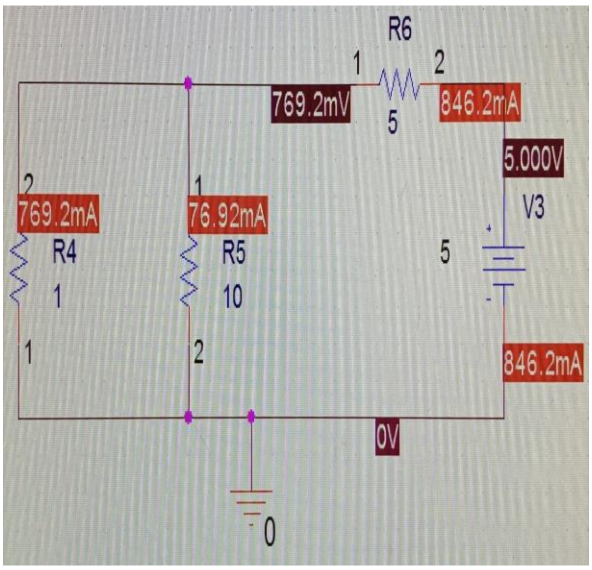
$= (2.156)^2 * (5.9)$

$= 27.42\ W$

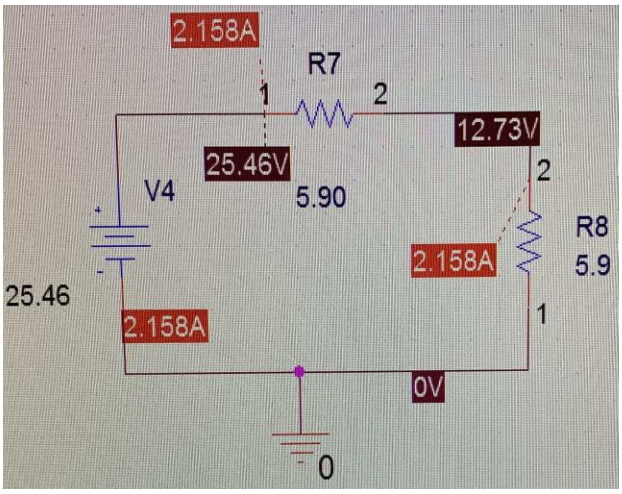
Simulation Results:



Case (1)



Case (2)



Case (3)

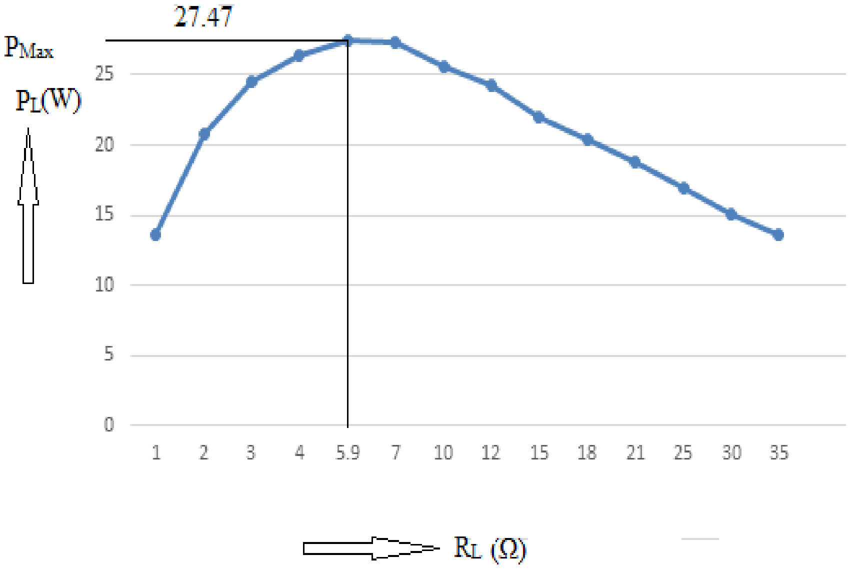
(1) Table 1: Finding Resistance 'R'

V (V)	I (mA)	R = V / I (Ω)
1	169.2	5.91
2	338.5	5.90
3	507.7	5.91
4	676.9	5.90
5	846.2	5.90

Mean R = 5.9 Ω

(2) Table 2: Finding Maximum Power 'P_{Max}'

R_L (Ω)	I_L (A)	[illegible]
1	3.69	13
2	3.223	20.
3	2.861	24
4	2.572	26
5.9	2.158	27
7	1.974	27
10	1.6	2
12	1.42	24
15	1.21	21
18	1.065	20
21	0.9465	18
25	0.8239	16
30	0.7092	15
35	0.6225	13.56



Conclusion & Inference:

Thus, the Maximum Power Transfer theorem for the given circuit is proved in P-SPICE simulation software.

Reg. No.	Name	Marks
19BCE0811	AKSHAT SRIVASTAV	