EXPEREMENT-4

AIM: To verify the Maximum Power Transfer Theorem with dc source using MULTISIM software.

SOFTWARE REQUIRED: MULTISIM software.

THEORY:

Maximum Power transfer theorem:

For DC Netwrok:

"Maximum power is transferred by a circuit to a load resistance (R_L) when R_L is equal to Thevenin's equivalent resistance (R_{Th}) of the network."

So for maximum power

$$R_L = R_{Th}$$

And maximum power will be

$$P_{max} = \frac{V_{Th}^2}{4R_L}$$

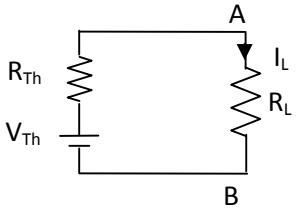

Fig.1 Thevenin's Equivalent Circuit

For AC Network:

"Maximum power is transferred by a circuit to load impedance (Z_L) when Z_L is equal to complex conjugate of Thevenin's equivalent impedance (Z_{Th}) of the network."

So for maximum power

$$Z_L = \overline{Z_{Th}}$$

And maximum power will be

$$P_{max} = \frac{V_{Th}^2}{4R_L}$$

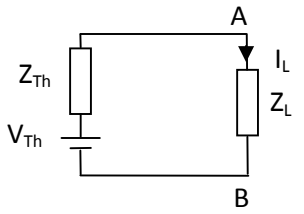

Fig.2 Thevenin's Equivalent Circuit

Circuits:

For DC source: Find out condition for maximum power transfer in the following circuit . Assume any value for R_L, R_{Th}, but V_{Th}= your class roll no Volts.

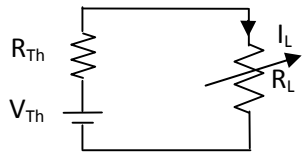

Fig.3: Circuit for Simulation

SOFTWARE CIRCUITS:

OBSERVATION:

S. No	**R_{Th} (Ω)**	**R_L(Ω)**	**Wattmeter Reading (Watt)**
1.			
2.			
3.			
.			
.			

CALCULATIONS:

Maximum power $P_{\max} = \frac{V_{Th}^2}{4R_L} = \ldots\ldots\ldots \; Watt$

Draw the graph between Power and load resistance R_L.

RESULT: In the above circuit and simulation it is clear that maximum power will transfer to load resistance when

$$R_L = R_{Th}$$

And maximum power will be

$$P_{max} = \frac{V_{Th}^2}{4R_L}$$

PRECAUTION:

1. Ground the circuit before simulation.
2. Design circuit carefully.
3. Use variable resistance carefully.
4. Save the file properly
5. Don’t change the setting the software and computer.