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TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

MIT-WPU

S. Y. B. Tech. (Electrical and Computer Engineering)

Semester: IV **Subject: Electrical Circuit Analysis**

Name: Shreerang. Mhatre **Class:**

Roll No: 29 **Batch:** A2

Experiment No: 06

Name of the Experiment: Verification of Maximum Power Transfer Theorem using MATLAB Simulink.

Performed on: 26/9/22

Submitted on: 4/10/22

Marks	Teacher's Signature with Date

Aim: To verify the Maximum Power Transfer Theorem using MATLAB Simulink.

Prerequisite: Knowledge of network theorem and MATLAB Simulink.

Theory:

The Maximum Power Transfer Theorem is one of the essential network theories. The maximum power transfer theorem helps us deduce the maximum external power generated with a finite internal resistance, in electrical circuit systems.

In electrical engineering, the maximum power transfer theorem states that, to obtain maximum external power from a power source with internal resistance, the resistance of the load must equal the resistance of the source as viewed from its output terminals.

The theorem results in maximum power transfer from the power source to the load, and not maximum efficiency of useful power out of total power consumed.

The theorem can be extended to alternating current circuits that include reactance, and states that maximum power transfer occurs when the load impedance is equal to the complex conjugate of the source impedance.

Applications of Maximum Power Transfer Theorem

The presence of linked sources enables the network to be active, so the Maximum Power Transfer Theorem is applied for active networks & passive networks.

- Maximum Power Transfer Theorem can also be implemented to linear networks, the network system, along with R, L, C, & restrained linear sources as elements.

- Maximum power transfer theorem functions only when there is a variable load. If not, choose the least available internal sources of impedance, which paves in maximum current through the fixed load. Consequently, maximum power is expelled by the load circuit.
- Large sound systems are built around this process. Maximum power transfer is generated in the circuit by making the speaker's (load) resistance equivalent to the resistance of the amplifier. Once the speaker and amplifier have equal resistance, both are considered harmonised.
- Another application is on the relationship between the starter motor and the battery of a car engine. Power applied to the starter will rely on the effectual resistance of the motor and battery resistance. When their values are equal, the highest power will be transmitted to kickstart the engine.

Procedure:

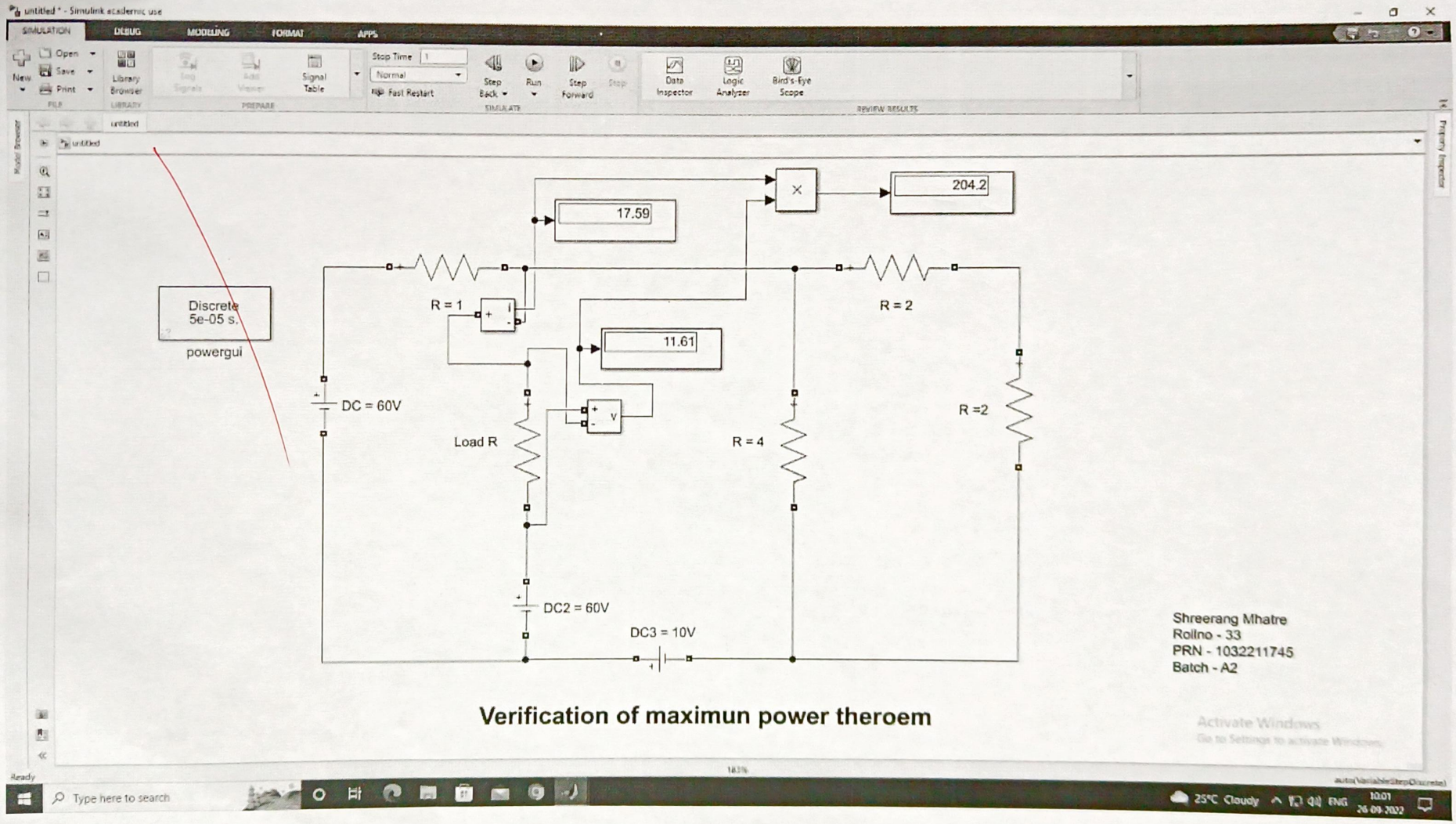
1. Start MATLAB.
2. Start Simulink, open the blank model.
3. Build the circuit as given in the class.
4. Measure power across load resistance.
5. Measure power by changing value of load resistance and try to get maximum value of it.
6. After getting load resistance value for maximum power, calculate its value theoretically and match both answers.

Activity:

Attach screenshots of above activity.

Post Lab Questions:

1. State the Maximum Power Transfer Theorem.
2. State the formula to calculate maximum power.
3. Theoretically calculate value of maximum power and match answer obtained from your model.


Discrete
5e-05 s.
powergui
17.59
204.2
R = 1
R = 2
11.61
DC = 60V
Load R
R = 4
R =2
DC2 = 60V
DC3 = 10V
Shreerang Mhatre
Rollno - 33
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Verification of maximun power theroem

* Post Lab Questions.

1) State the Maximum Power Transfer Theorem.

-> In electrical engineering, the maximum power transfer theorem states that, to obtain maximum external power from a power source with internal resistance, the resistance of the load must equal the resistance of the source as viewed from its output terminals.

2) State the formula to calculate maximum power.

-> The condition for maximum power dissipation across the load is $R_L = R_{Th}$. That means, if the value of load resistance is equal to the value of source resistance i.e., Thevenin's resistance, then the power dissipated across the load will be of maximum value.

$$P_m = \frac{V_{Th}^2}{4 R_{eq}} \quad \text{watts}$$

MW
4-10-22