

Experiment No : 06

Name of the Experiment : Verification of Maximum Power Transfer Theorem.

Objective:

- To verify the Maximum Power Transfer Theorem experimentally by determining the load resistance at which the maximum power is delivered in an electrical circuit.
- To measure and compare the power delivered to the load resistor at various resistance values to identify the condition for maximum power transfer.
- To gain practical experience in constructing electrical circuits and using measuring instruments such as voltmeters and ammeters effectively.
- To understand the practical application of the Maximum Power Transfer Theorem in optimizing the design and analysis of electrical circuits.

Theory:

The Maximum Power Transfer Theorem states that maximum power is delivered to a load when the load resistance (R_L) matches the internal resistance (R_S) of the source. The power (P) delivered to the load is given by:

$$P = \frac{V^2}{(R_S + R_L)^2} \times R_L$$

Maximum power transfer occurs when:

$$R_L = R_S$$

This principle is essential for optimizing power delivery in circuits. In this experiment, the theorem is verified by varying the load resistance and observing that maximum power is achieved when $R_L = R_S$.

Apparatus:

- Ammeter (1 pieces; 0-5A)
- Voltmeter (1 pieces, 0-450V)
- Multimeter (1 pieces)
- Resistor (3 pieces; $370\ \Omega$, $108\ \Omega$, $37\ \Omega$)
- AC voltage source (220V, 50Hz)
- Connecting wires

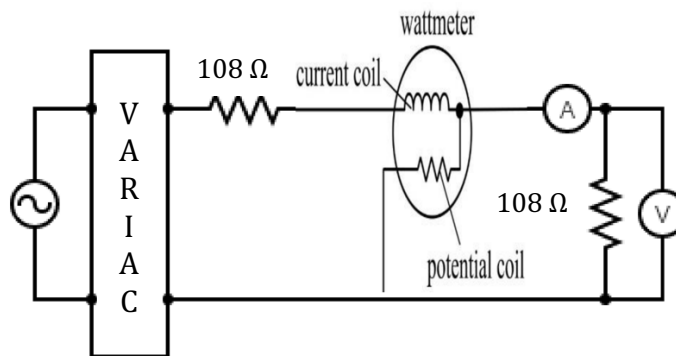
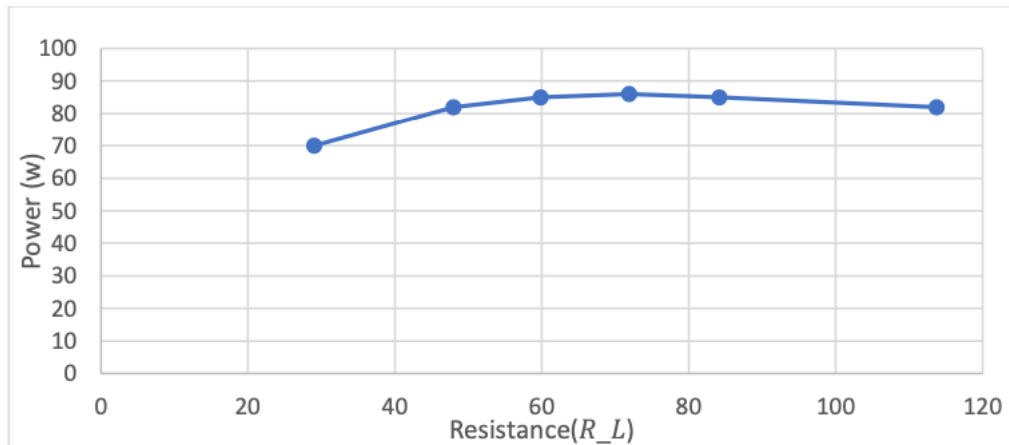
Circuit Diagram:

Figure-01: Electric Circuit

Data Table:

SL no.	Thevenin's Resistance, $R_{th} (\Omega)$	Load Current, $i (A)$	Load Voltage, $v_1 (V)$	Load Resistance, $R_L (\Omega)$	Load Power, $P (W)$
1	70	1.55	45	29.03	70
2		1.30	62.40	48	82
3		1.20	71.8	29.83	85
4		1.10	79.10	71.90	86
5		0.95	88.60	84.17	85
6		0.85	96.70	113.76	82

Graph :



Result:

The load resistance R_L at which maximum power is transferred is approximately equal to the internal resistance R_{Th} of the source, as per the Maximum Power Transfer Theorem.

Conclusion:

The experiment confirmed the Maximum Power Transfer Theorem. It showed that the load received maximum power when (R_L) was approximately equal to (R_{Th}). This aligns with the theoretical prediction.