Experiment No : 5

Name of the Experiment : Verification of Thevenin Theorem.

Objective:

- To verify Thevenin's Theorem experimentally by simplifying a complex electrical circuit into its Thevenin equivalent circuit.
- To measure and compare the output voltage and current across a load resistor for both the original and Thevenin equivalent circuits.
- To gain practical experience in constructing electrical circuits and using measuring instruments such as voltmeters and ammeters.
- To understand the practical application of circuit simplification techniques in analyzing and solving electrical networks.

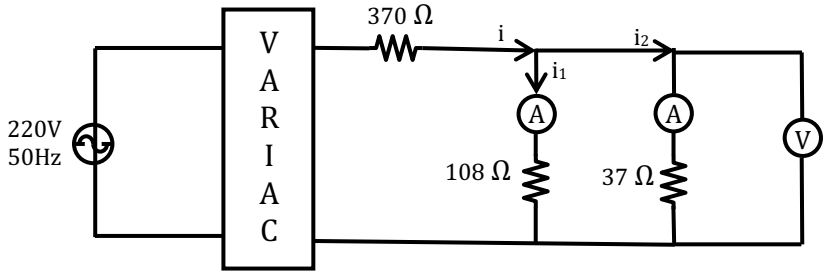
Theory:

Thevenin's Theorem is a fundamental principle in electrical circuit analysis that allows the simplification of a complex linear circuit into an equivalent circuit. According to Thevenin's Theorem, any linear circuit containing independent voltage or current sources, resistances, and linear components can be replaced by an equivalent circuit consisting of a single voltage source in series with a single resistor connected to the load.

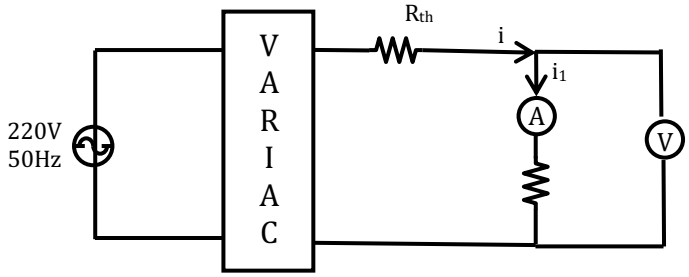
Apparatus:

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

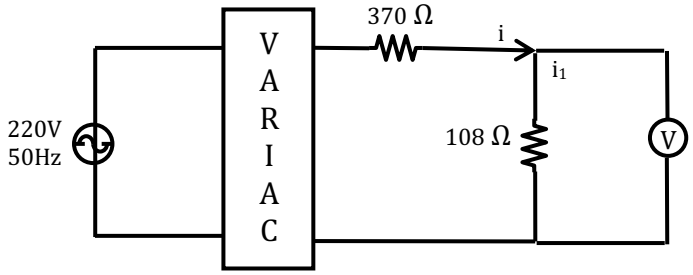
Circuit Diagram:



(a)



(b)



(c)

Figure-01: Electric Circuit

Data Table:

SL no.	Load Current, i (A)	Load Voltage v (V)	Thevenin's Voltage, V (V)	Thevenin's Resistance, R_{th} (Ω)	Load Current, i_1 (A)	Load Voltage v_1 (V)	Error of Load Current	Error of Load Voltage
1	0.30	10	18.50	25.6	0.29	9.85	3.33%	1.50%
2	0.65	19.36	34.34	23.4	0.64	19.60	1.54%	1.24%%

Result:
Thevenin's theorem was successfully verified. The experimental values of V_{th}, R_{th} and load parameters closely matched the theoretical values, with a minimal percentage error.

Conclusion:

The experiment successfully verified Thevenin's theorem by demonstrating that a complex circuit could be replaced with its Thevenin equivalent, consisting of a single voltage source (V_{th}) in series with a resistance (R_{th}). The load voltage and current measured in the original circuit matched closely with those in the Thevenin equivalent circuit, validating the theorem. Minor deviations between theoretical and experimental results were observed, which can be attributed to measurement errors, resistor tolerances, and contact resistance. Overall, the experiment confirmed that Thevenin's theorem is a reliable and practical method for simplifying circuit analysis with varying loads.