

Heaven's Light is Our Guide



Rajshahi University of Engineering & Technology

Department of Electrical & Computer Engineering

Lab Report

Course Code : ECE 1202

Course Title : Circuits and Systems- II

Experiment no :03

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Submitted To:	Submitted By:
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Name of the Experiment: Power measurement of a balanced 3-phase system using wattmeter method.

Theory: In a balanced 3-phase system, power can be measured using the two-wattmeter method. Two wattmeters are connected to two phases, while the third phase serves as a reference. The sum of the readings from both wattmeters gives the total power in the system. This method works for both star and delta connections, and the individual wattmeter readings account for both active power and phase angles.

Required Apparatus:

1. Variac
2. Ammeter/Clamp on Ammeter
3. Voltmeter
4. Wattmeter
5. Resistor
6. Multimeter
7. Connecting Wires

Circuit Diagram:

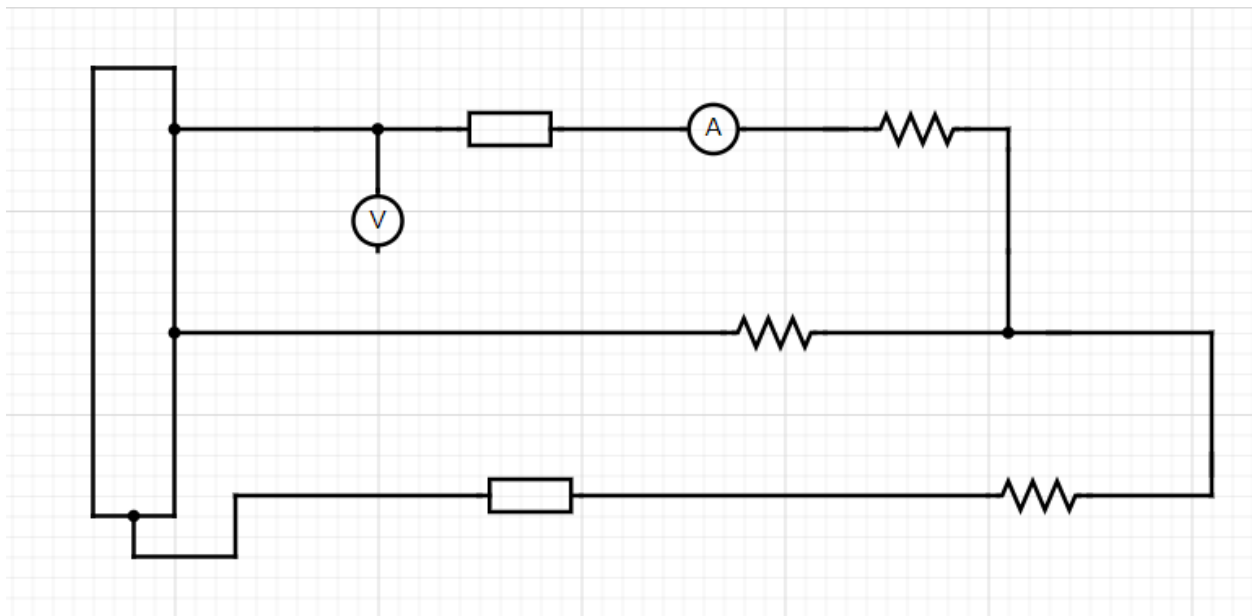


Fig. Circuit Diagram

Data Table:

Sl.	P ₁	P ₂	P _T (m)	P _T (c)	% error	V _L	I _L (mA)
1	22	23	45	58.97	31.04	68.1	0.5
2	30	28	58	53.97	6.95	77.9	0.4
3	36	35	71	90.47	27.42	84.2	0.62
4	42	42	84	103.97	23.77	89.6	0.67

7, 8, 10, 15, 25, 27 → Roll

Lab ③

10-0-2024

$P_1 + P_2$ → $\sqrt{3} V_L I_L$

Sl.	P ₁	P ₂	P _T (m)	P _T (c)	% error	V _L	I _L
1	22	23	45	58.97		68.1	0.5 mA
2	30	28	58	53.97		77.9	0.4 A
3	36	35	71	90.47		84.2	0.62
4	42	42	84	103.97		89.6	0.67

Calculation:

$$P_T = \sqrt{3} v_L I_L = \sqrt{3} \times 68.1 \times 0.5 = 58.97, e = \left| \frac{58.97 - 45}{45} \right| \times 100\% = 31.04$$

$$P_T = \sqrt{3} v_L I_L = \sqrt{3} \times 77.9 \times 0.4 = 53.97, e = \left| \frac{53.97 - 58}{58} \right| \times 100\% = 6.95$$

$$P_T = \sqrt{3} v_L I_L = \sqrt{3} \times 84.2 \times 0.62 = 90.47, e = \left| \frac{90.47 - 71}{71} \right| \times 100\% = 27.42$$

$$P_T = \sqrt{3} v_L I_L = \sqrt{3} \times 89.6 \times 0.67 = 103.97, e = \left| \frac{103.97 - 84}{84} \right| \times 100\% = 23.77$$

Conclusion: In the experiment to measure power in a balanced 3-phase system using the two-wattmeter method, the total power was accurately determined by $P_T = \sqrt{3} v_L I_L$ formula and the error was also determined. The experiment confirmed that the two-wattmeter method is effective for power measurement in both balanced and unbalanced loads.