Heaven's Light is Our Guide

Rajshahi University of Engineering & Technology

Department of Electrical & Computer Engineering

Lab Report

Course Code	**ECE 1202**
Course Title	Circuit and System || Sessional
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Name of the Experiment: Power measurement of three phase balanced system using two wattmeter method.

Theory: The two-wattmeter method is a practical technique used to measure power in a three-phase balanced system. It works by placing two wattmeters across two of the three phases, each connected between one phase and the common neutral or third phase. The total power is determined by summing the readings of both wattmeters, where each wattmeter measures the power in its respective phase. In a balanced system, the sum of the wattmeter readings equals the total real power, and their difference provides information about reactive power.

Circuit diagram:

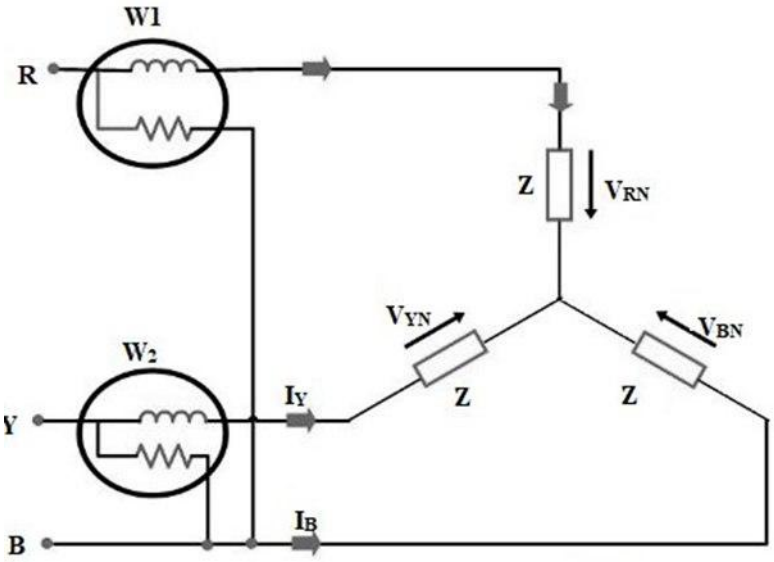

Fig : 3 phased balanced system using two wattmeter method

Required Apparatus:

1) Supply
2) Variac
3) Resistor
4) Voltmeter / multimeter
5) Ammeters or clamp of Ammeter
6) Wattmeters
7) Connecting wires

Data Table:

SL No	P1	P2	P_m=P1+P2	V_L	I_L	$P_c=\sqrt{3}V_LI_L$	Error(%)
1	22	28	50	72.5	0.53	66.554	24.87
2	28	32	60	79.9	0.609	84.28	28.8
3	36	40	76	87.4	0.666	100.82	24.62
4	45	48	93	94.8	0.726	119.208	21.985
5	50	50	100	98.6	0.73	124.67	19.79

Calculation:

For the 1st one:

P_m=P1+P2=22+28=50 W, $P_c = \sqrt{3}V_LI_L = \sqrt{3} * 72.5 * 0.53$ =66.554 W, Error = 24.87%

For the 2nd one:

P_m=P1+P2=28+32=60 W, $P_c = \sqrt{3}V_LI_L = \sqrt{3} * 79.9 * 0.609$ =84.28 W, Error = 28.8%

For the 3rd one:

P_m=P1+P2=36+40=76 W, $P_c = \sqrt{3}V_LI_L = \sqrt{3} * 87.4 * 0.666$ =100.82 W, Error = 24.62%

For the 4th one:

P_m=P1+P2=45+48=93 W, $P_c = \sqrt{3}V_LI_L = \sqrt{3} * 94.8 * 0.726$ =119.208 W, Error = 21.985%

For the 5th one:

P_m=P1+P2=50+50=100 W, $P_c = \sqrt{3}V_LI_L = \sqrt{3} * 98.6 * 0.73$ =124.67 W, Error = 19.79%

Conclusion:

In conclusion, the two-wattmeter method effectively measures the total power in a three-phase balanced system. By connecting two wattmeters between different phase pairs, the sum of their readings gives the total real power, while the difference provides information about the reactive power. This method is advantageous because it works for both balanced and unbalanced loads and does not require access to the neutral wire. The experiment demonstrates the accuracy and simplicity of the two-wattmeter method, making it widely applicable in practical power measurement scenarios.