

Heaven's Light is Our Guide



Rajshahi University of Engineering & Technology

Department of Electrical & Computer Engineering

Lab report-01

Course Code : ECE 1202
Course Title : Circuits and Systems-II Sessional
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Submitted To:	Submitted By:
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Experiment no: 01

1. **Experiment name:** Study the relationship between phase voltage and line voltage of a wye connected 3-phase balanced system.
2. **Objective:** The main objective of this experiment is to understand the relationship between phase voltage and line voltage and to verify the theoretical relationship between line voltage and phase voltage through practical measurement in a wye-connected 3-phase balanced system.
3. **Theory:** In a wye-connected 3-phase balanced system, the phase voltage is the voltage between a phase or line and neutral point. The line voltage is the voltage between two phase or line. The mathematical relation between phase voltage and line voltage in a wye connected 3-phase balanced system is,

$$V_L = V_P \times \sqrt{3}$$

Here, V_L is line voltage and V_P is phase voltage.

4. Required apparatus:

- i. Source
- ii. VARIAC
- iii. Voltmeter
- iv. Ammeter
- v. Resistors
- vi. Multimeter
- vii. Connecting wires

5. Circuit diagram:

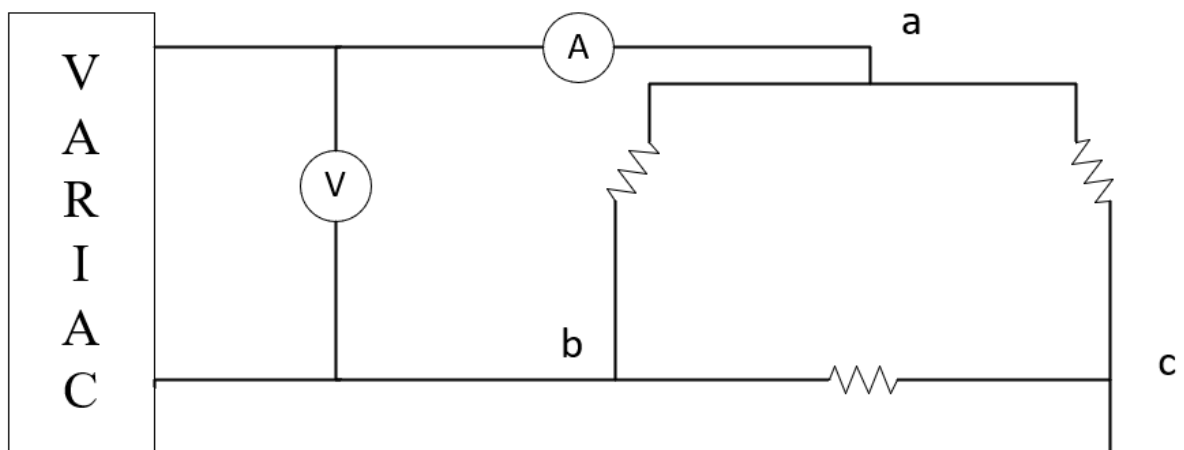


Figure: Wye connected 3-phase balanced system

6. Data table:

Sl no.	Line voltage, $V_L(V)$	Measured phase voltage, $V_P(V)$	Calculated phase voltage, $V_P(V)$	Line current, $I_L(A)$	Phase current, $I_P(A)$	Percentage of error
1	41.7	23.5	24.07	0.24	0.24	2.43
2	34.1	19	19.69	0.21	0.21	3.63
3	55.5	31.4	32.04	0.358	0.35	2.05
4	63.6	35.6	36.72	0.407	0.4	3.14
5	71.7	40.5	41.4	0.462	0.46	2.21

7. Discussion: The experiment successfully demonstrated that, in a wye connected 3-phase balanced system the line voltage is $\sqrt{3}$ times of the phase voltage. The experimental measurement closely matched the theoretical values, confirming the relationship. Minor differences were observed due to measurement inaccuracies, connection issues or slight imbalance in the system. Despite these differences, the result validates the theoretical model, emphasizing its importance in designing and analyzing three phase electrical systems.

8. Precautions:

- Ensured all connections were secured and double checked before powering the circuit to avoid short circuit or any other safety hazard.
- Handled measuring equipment carefully to get accurate reading.
- Been cautious of the power rating of the instruments to avoid overheating.

9. References:

- Fundamentals of Electric Circuits; Charles K. Alexander and Mathew N. O. Sadiku
- Wikipedia (delta connected three phase balanced system)
- Google