"Heaven's Light is Our Guide"

Rajshahi University of Engineering & Technology

Rajshahi, Bangladesh

Department of Electrical & Computer Engineering

Course Code: ECE 1205
Course Title: Circuits and systems Sessional-II

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Experiment No :1
Experiment Name: Study the relationship between phase and line voltages of wye connected 3-phase balanced system.

Objective:

i. To determine phase and line voltage and current of a balanced 3-phase wye connection
ii. To verify the relation between phase voltage and line voltage.

Theory:

3-Phase balanced system is a polyphase system where three voltage sources produce voltages with same magnitude but the phases differ from one another by 120 degrees. Loads with same impedance can be connected with a 3-phase balanced system in two configuration Wye(Y) and Delta. In this experiment, wye configuration is observed. In a poly phase system line voltage is the potential difference between two lines and phase voltage is the potential difference between a phase and the neutral junction. The current flowing in the line is called line current and current flowing in one of the windings of the generator is called phase current. The relationship between line voltage, phase voltage and line current and phase current is,

$$I_p = I_L$$

And, $V_P = \frac{V_L}{\sqrt{3}}$

Diagram:

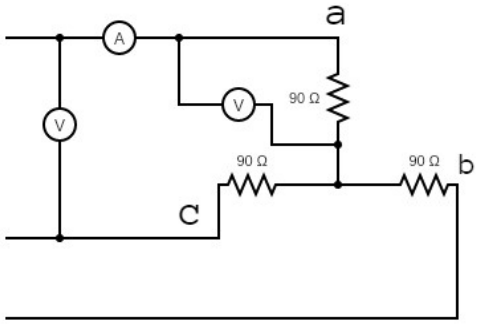

Fig.1: Wye connection of a 3-phase system.

Required Apparatus:

1.Source

2. Ammeter

3.Resistor (Three)

4.Connecting Wire

5.Multimeter

Data Table:

SL	V_L	V_P(m)	V_P(cal)	Error	I_P	I_L
1	48.6 v	28.02 v	28.05 v	0.107%	0.29	0.29
2	42.7 v	24.01 v	24.65 v	2.67%	0.24	0.24
3	33.9 v	19.40 v	19.37 v	0.154%	0.19	0.19
4	58.4 v	33.34 v	33.71 v	1.109%	0.34	0.34
5	23.21 v	13.25 v	13.4 v	1.13%	0.12	0.12

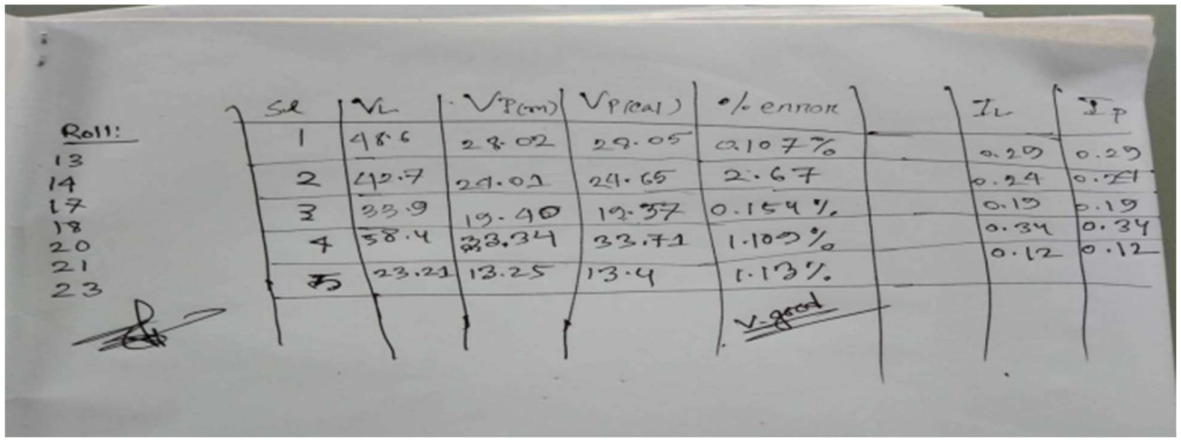

Fig.2: Table from lab

Calculation:

For phase voltage,

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

for phase current, $I_p = I_L$

error $= \frac{0.107+2.67+0.154+1.109+1.13}{5}\%$

$=1.034\%$

Result:

The phase current and the line current was equal according to the theory. But there was 1.034% error in relation of phase voltage and line voltage.