

*Heaven's Light is Our Guide*

## **Rajshahi University of Engineering & Technology**



### **Course Title**

Circuit and System -II Sessional

**Course No** : ECE 1202

**Lab Report No** : 01

**Date of Submission** :16-09-2024

**Experiment No** : 01

**Experiment Nme** :

Study the relationship between phase and line voltages of wye (Y) connected 3- $\phi$  balanced system.

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## Experiment No:01

**Name of The Experiment:** Study the relationship between phase and line voltages of wye (Y) connected 3- $\phi$  balanced system.

### Objectives:

- 1.To learn how to make wye (y) connection .
- 2.To study the relationship between voltage and current in three phase system.

### Required Apparatus:

1. Source
2. Ammeter
3. Resistor
4. Multimeter
5. Connecting Wire

### Theory:

In Figure 1.1 the relationship between the line-to-line voltages and the line-to-neutral voltages for a balance Y-connected load is presented. Note that same relationships hold true for a balanced Y-connected source. In a wye-connected system the line voltage is  $V_L$  (approximately 1.73) times greater than the phase voltage, as indicated in the following equation:  $V_L = \sqrt{3}V_P$  & line current is equal to phase current ( $I_L = I_P$ ), Where  $V_{an}, V_{bn}$  &  $V_{cn}$  is the phase voltage.

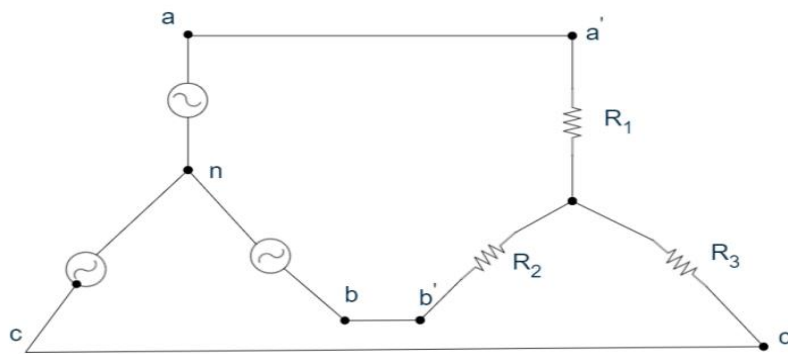
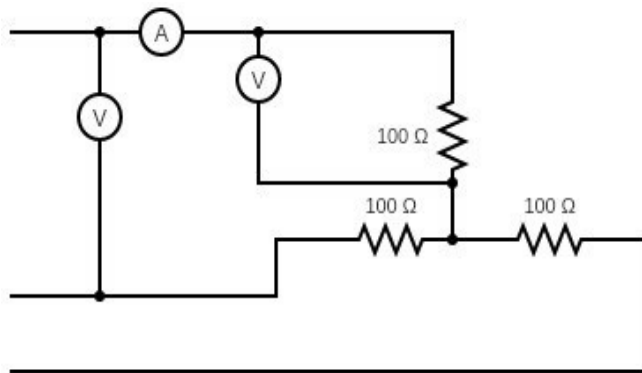


Fig. 1.1: Y-Y Connection

### Circuit Diagram:



### Procedure:

1. Using the necessary components, a circuit was built by following the circuit diagram.
2. The ammeter and voltmeter were connected according to the diagram.
3. Voltmeter and ammeter readings were recorded into a data table, and an error calculation was made.

### Calculation:

For 1st calculation,

$$V_L = 74.6 \text{ V}, V_{P(c)} = V_L / \sqrt{3} = 43.07 \text{ V}, V_{P(m)} = 44 \text{ V}, \text{Error} = 2.114\%$$

For 2nd calculation,

$$V_L = 92.8 \text{ V}, V_{P(c)} = V_L / \sqrt{3} = 53.59 \text{ V}, V_{P(m)} = 54 \text{ V}, \text{Error} = 0.76\%$$

For 3rd calculation,

$$V_L = 39.60 \text{ V}, V_{P(c)} = V_L / \sqrt{3} = 22.86 \text{ V}, V_{P(m)} = 23.34 \text{ V}, \text{Error} = 2.1\%$$

### Data Table:

SL No	$V_L$	$V_{P(m)}$	$V_{P(c)}$	$I_L$	$I_P$	Error(%)
1	74.6 2.	44	43.07	0.37	0.37	2.11
2	92.8	54	53.59	0.49	0.49	0.76
3	39.60	23.34	22.86	0.23	0.23	2.1

Data from Lab:

$V_L$	$V_P(m)$	$V_P(c)$	$I_L$	$I_P$	error
74.6	44	43.07	0.97	0.97	2.119 %
92.8	59	53.59	0.99	0.99	0.76 %
39.60	23.34	22.86	0.23	0.23	2.1 %

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### Result:

From the data table, we can see that the result is almost same as we expected though it shows some error but that was very small. So it can be said that,

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

& line current is equal to phase current ( $I_L = I_P$ )

### Discussion:

In the Balanced-3 Phase System there will be four combinations. They are Wye-Wye, Wye- $\Delta$ ,  $\Delta$ -Wye and  $\Delta$ - $\Delta$ . The variac which had been provided in our lab, is Wye connected 3 Phase source. When we connected 3 resistance of same value the system was in balanced. For Wye Load connected system we had been found the Line Voltage  $V_L$  is  $\sqrt{3}$  times of the phase voltage  $V_P$ . There was some error between calculated value and measured value because of instrumental and human error.