Practical No. 5: Measure the live voltage, phase voltage and phase current and line current in three phase delta connected balanced load.

I Practical Significance:

In practice, large power application like Transformer, Transmission line etc. use three phase systems. In a three phase circuit loads can be connected in balanced star and delta mode. Practical will help the students to acquire necessary skills.

II Industry/Employer Expected Outcome(s):

Three-phase power is commonly used in factories and manufacturing plants to power large equipment such as compressors, pumps, conveyors, and motors, often use three-phase power to run large fans and pumps It is necessary to formulate voltage and current relations for system parameters for testing, calculations and interpretations.

III Course Level Learning Outcome(s):

Calculate and measure basic electrical quantities and parameters.

IV Laboratory Learning Outcome(s):

LLO Find the phase voltage and line current relation in delta connected load.

V Relevant Affective Domain related outcome(s):

Follow safety electrical rules for safe practices.

VI Relevant Theoretical Background (With diagrams if required):

The delta in a three-phase system is formed by connecting one end of the winding to the starting end of other winding and the connections are continued to form a closed loop. The star in the three-phase system is formed by connecting one end of all three impedances are connected together.

In **Delta (Δ) or Mesh connection**, the finished terminal of one winding is connected to start terminal of the other phase and so on which gives a closed circuit. The three-line conductors are run from the three junctions of the mesh called **Line Conductors**.
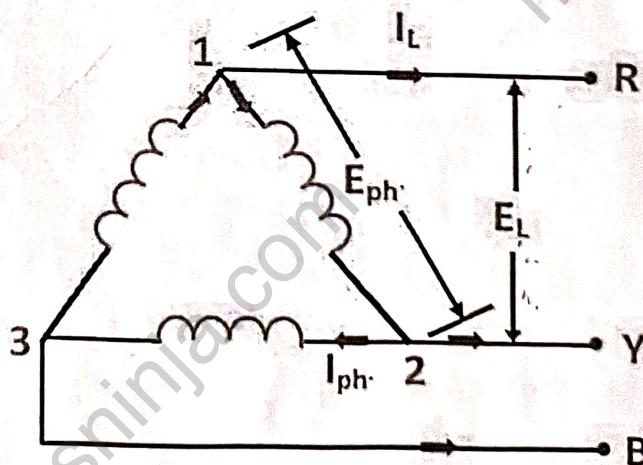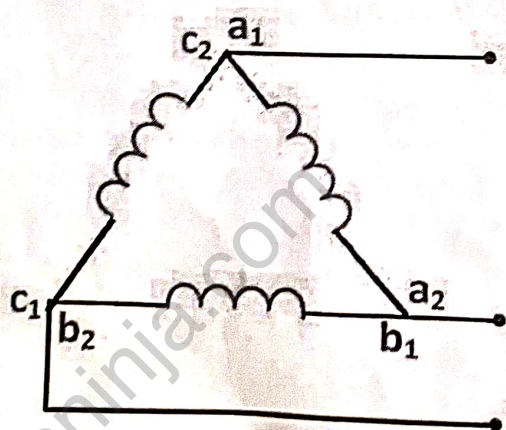
XI Required Resources/apparatus/equipment with specification:

S. No.	Name of Resource	Suggested Broad Specification	Quantity
1	3 phase Variac	Suitable 3 phase variac	1 No.
2	3 phase load	Suitable range	1 No.
3	AC Ammeter	Suitable AC ammeter	2 No.
4	AC Voltmeter	Suitable AC voltmeter	2 No.

XII Actual Procedure Followed:

1. Connect circuit as shown in circuit diagram.

2. Confirm all the meters should be at zero position.

3. Set the rheostat at maximum position.

4. Set the auto transformer output voltage zero.

5. Switch ON the supply.

XIII Observation and Calculation table:

Sr. No.	Line Voltage (volts)	Phase Voltage (volts)	Line current (amp)	Phase Current (amp)	Ratio V_L/V_{ph}	Ratio I_L/I_{ph}
1	108	64	1.8	1.8	1	1.68
2	225	138	2.9	2.9	1	1.69
3	355	210	3.9	3.4	1	1.69

XIV Result(s):

Three phase circuit leads can be connected in balanced in delta connection.

XV Interpretation of results:

Three phase circuit leads can be connected in balanced load in delta connection.

XVI Conclusion and recommendation:

We have learn to measure the line voltage, phase voltage and phase current & line current in three phase delta connection balanced load.

XVII Practical related questions (Provide space for answers)

1. Define balanced load and unbalanced load.
2. State the application of Delta connection.
3. What are the advantage of three phase system over single phase system?
4. Compare Star and delta connection.

1. balanced load : is a load where the impedance of each phase is equal.
unbalanced load : is a load where the impedance of each phase is not equal.

2. 1. Power transmission and distribution.
2. Induction motors.
3. transformers.
4. power factor correction.

3. 1. Higher power Transmission
2. Greater efficiency.
3. Smaller conductors.
4. higher starting torque.

4.

Star Connection	Delta Connection
1. three phase are connected to a common point, forming a star shape.	1. Three phase are connected in a triangular shape, forming a delta.
2. The neutral point is available	2. there is no neutral point available
3. The voltage between any two phases is same as the line voltage.	3. The voltage between any two phase is √3 time the phase voltage