

Practical No. 7: Determine the transformation ratio current ratio of single phase transformer.

I Practical Significance:

A single phase Transformer is used for changing voltage levels in electronic circuits. Mostly electronic devices/ circuits are energized with DC supply. To lower the voltage level of AC supply voltage transformer is used and this lowered AC voltage level further rectified to DC supply. Voltage ratio of a transformer decides increasing or decreasing voltage level.

II Industry/Employer Expected Outcome(s)

Use electrical equipment efficiently for different electronic engineering application.

Determine voltage and current ratio of single phase transformer.

III Course Level Learning Outcome(s)

Select the transformer and DC motor for the given application

IV Laboratory Learning Outcome(s)

LLO Calculate transformation ratio of transformer.

LLO Connect transformer to given load.

V Relevant Affective Domain related outcome(s)

Follow safety electrical rules for safe practices.

VI Relevant Theoretical Background

Voltage ratio: The voltage ratio of a transformer is equal to the ratio of primary voltage and secondary voltage

$$\text{voltage ratio} = \frac{V_p}{V_s}$$

Where

V_p = Primary voltage

V_s = secondary voltage

Current ratio: The current ratio of a transformer is equal to the ratio of primary current and secondary current

$$\text{current ratio} = \frac{I_p}{I_s}$$

Where

I_p = primary current I_s = secondary current

XI Required Resources/apparatus/equipment with specification:

S. No.	Name of Resource	Suggested Broad Specification	Quantity
1	Ammeter	0-10 A 0-10 A AC	2
2	voltage	0-300 V A	2
3	Single phase transformer	1 kVA 230/115 V single phase transformer	1
4	Resistive load	Single phase 230V, 15 A Resistive load	1

XII Actual procedure followed:

1. connect the circuit as per circuit diagram
2. Switch on power supply
3. Note down reading of ammeter and voltage
4. calculate current and voltage ratio

XIII Observations and calculations

Sr. No.	Primary Voltage (V _p)	Secondary Voltage (V _s)	Primary Current (I _p)	Secondary Current (I _s)	Voltage Ratio = (V _p /V _s)	Current Ratio = (I _p /I _s)
1	230	110	6.5	13.6	2.09	0.47
2	200	100	6	12.5	2	0.25
3	175	84	5.5	11.4	2.08	5.48
4	150	75	5	10.5	2	5.25

XIV Results:

Voltage Ratio is more and current ratio is less for given transformer

XV Interpretation of results:

above the above observation table secondary voltage is depend upon primary voltage.

XVI Conclusion and recommendation

for this practical, we determine the transformer ratio and current ratio of single phase transformer.

XVII Practical related questions (Provide space for answers)

1. Define transformer.
2. Define voltage ratio.
3. Define current ratio.
4. Define transformation ratio.
5. State EMF equation of single phase transformer.
6. Define step up and step down transformer.
7. Give applications of step up and step down transformer.

1. A transformer is an electrical device used to change the voltage level of alternating current AC in circuit.

2. The voltage ratio is the comparison of the voltage between two points in electrical circuit.

$$\text{Voltage Ratio} = \frac{V_{out}}{V_{in}}$$

3. The current ratio is the comparison of the current flowing through two points in electrical circuit.

$$\text{Current Ratio} = \frac{I_{out}}{I_{in}}$$

4. The transformation ratio of a transformer is the ratio of the number of turns in the primary coil to the number of turns in the secondary coil.

$$\text{Transformer Ratio} = \frac{N_1}{N_2}$$

5. The EMF (Electromotive Force) equation of a single-phase transformer relates the voltage induced in the primary and secondary windings to the no. of turns in those winding and the flux

$$E_1 = 4.44 f N_1 \Phi_{\max}$$

$$E_2 = 4.44 f N_2 \Phi_{\max}$$

6. A step-up transformer and step-down transformer are two types of transformers that differ in their purpose and operation based on the turn ratio between the primary and secondary windings.

7. Application of step-up transformer

1. power transmission
2. Electricity grids.
3. High voltage testing.
4. medical Equipment.

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Applications of Step down

- 1 Power distribution
- 2 Household appliances
- 3 low voltage Industrial equipment
4. power supplies for electronics