

⇒ This lab experiment will be performed in EPS room 119.

Scope:

- Use the network analyzer to measure AC voltages, current and power.
- Understand standard terminal markings.
- Determine transformer polarity marks.
- Understand transformer connections.

⚡ Attention ⚡ ☠ DANGER ☠

In this lab experiment you will use voltage levels that can be dangerous. Follow ALL safety guidelines explained by your TA.

The standard precautions include:

- **Connect the apparatus without power connected: have the instructor check your connections BEFORE applying power.**
- **Be careful not to touch “live” terminals.**
- **Make sure the power source is off BEFORE changing connections.**
- **Absolutely no horseplay in the lab.**
- **Eliminate distractions: focus on your work at the lab bench.**

No Pre-Lab assignment this week

Special Note: Your lab TA must sign-off on each step before you proceed.

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- 1) In the space provided below, sketch the circuit diagram for testing a single-phase 117/25 V transformer under load. Show the connections for a power analyzer on the high voltage (117 V_{rms}) side and one on the low voltage (25 V_{rms}) side, between the transformer and the load. Use a general impedance Z_L to indicate the load.

Single-Phase Transformer Test Circuit. TA approval of sketch: _____

- 2) Assemble the approved circuit diagram for the transformer load test but do not turn on the power. Have your assembled circuit approved by your lab TA.

TA approval of circuit: _____

- 3) Examine the transformer's nameplate and identify the rated current on its high-voltage and low-voltage sides

I_{rated} on high voltage side = _____

I_{rated} on low voltage side = _____

- 4) Carefully connect the high-voltage side of the transformer to the 120 V_{rms} AC source.

- 5) Make the measurements required to complete Table 10.1 for the different load resistance values given, and calculate the transformer efficiency. **Make sure in each case you will not exceed the transformer rated currents.**

Always remember:

Turn OFF the power before changing connections.

Plot (on a separate sheet) the transformer efficiency versus load current, using measured data.

Table 10.1: Single-Phase Transformer with Load Measurements and Calculations

R_{load} (Ω)	V_{load} (V)	I_{load} (A)	P_{load} (W)	V_{in} (V)	I_{in} (A)	P_{in} (W)	Eff (%)
∞ (open)							
100							
50							
100 50							
25							
50 25							
25 25							

Explain how the measurements from step (5) can be used to determine the dot convention of a transformer.

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- 6) In the space provided to the right, sketch the circuit diagram for connecting the transformer primary and secondary windings to obtain the voltage transformation **117V/92V**.

Single-Phase 117V/92V Test Circuit.

TA approval of sketch: _____

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- 7) In the space provided to the right, sketch the circuit diagram for connecting the transformer primary and secondary windings to obtain the voltage transformation **117V/142V**.

Single-Phase 117V/142V Test Circuit.

TA approval of sketch: _____
