

Objective

To study the relationship between primary and secondary values in single phase transformers.

Part 1

1. Connect the transformer primary (120V Terminals 1 and 2) at 120V. Remember that the maximum current for any coil is only 0.5A. Always calculate and measure this for each step to insure this. Remember that the primary is always the line voltage.
2. Set each resistance to 400 ohms and connect to terminals 5 and 9 (60V). Remember to use the ohmmeter to measure the resistance.
3. Remember to always draw the circuit diagram.
4. Turn on the power supply and adjust for 120V (actual) line voltage.
5. Measure and record the voltage across and the current through the load resistor.
6. Measure and record the primary and secondary voltages and currents.
7. Determine the transformer turns ratio.
8. Compare the impedance looking into the primary of the transformer with the load impedance.
9. Use the wattmeter and measure the power into the primary of the transformer.
10. Use the wattmeter and measure the power into the impedance. Compare with the calculated Apparent Power using the measured values.
11. Calculate the total power delivered to the impedance from the secondary of the transformer and the total power delivered to the transformer from the power supply. Compare with the calculated Apparent Power using the measured values.

Part 2

1. Connect the transformer primary (120V Terminals 1 and 2) at 120V.
2. Set each resistance to 400 ohms and connect to terminals 3 and 7 (104V).
Remember to use the ohmmeter to measure the resistance.
3. Remember to always draw the circuit diagram.
4. Turn on the power supply and adjust for 120V (actual) line voltage.
5. Measure and record the voltage across and the current through the load resistor.
6. Measure and record the primary and secondary voltages and currents.
7. Determine the transformer turns ratio.
8. Compare the impedance looking into the primary of the transformer with the load impedance.
9. Use the wattmeter and measure the power into the primary of the transformer.
10. Use the wattmeter and measure the power into the impedance. Compare with the calculated Apparent Power using the measured values.
11. Calculate the total power delivered to the impedance from the secondary of the transformer and the total power delivered to the transformer from the power supply. Compare with the calculated Apparent Power using the measured values.

Part 3

1. Connect the transformer primary (120V Terminals 1 and 2) at 120V.
2. Connect a resistor (set to 400 ohms) in series with an inductor (set to 0.8H) and connect to terminals 5 and 9 (60V).
3. Remember to always draw the circuit diagram.
4. Turn on the power supply and adjust for 120V (actual) line voltage.
5. Measure and record the voltage across and the current through the load resistor.
6. Measure and record the primary and secondary voltages and currents.
7. Determine the transformer turns ratio.
8. Compare the impedance looking into the primary of the transformer with the load impedance.
9. Use the wattmeter and measure the power into the primary of the transformer.
10. Use the wattmeter and measure the power into the impedance. Compare with the calculated Apparent Power using the measured values.
11. Calculate the total power delivered to the impedance from the secondary of the transformer and the total power delivered to the transformer from the power supply. Compare with the calculated Apparent Power using the measured values.

Part 4

1. Connect the transformer primary (Terminals 5 and 9) at 60V. This is reversing the transformer in previous step.
2. Connect a resistor (set to 400 ohms) in series with an inductor (set to 0.8H) and connect to terminals 1 and 2 (120V).
3. Remember to always draw the circuit diagram.
4. Turn on the power supply and adjust for 120V (actual) line voltage.
5. Measure and record the voltage across and the current through the load resistor.
6. Measure and record the primary and secondary voltages and currents.
7. Determine the transformer turns ratio.
8. Compare the impedance looking into the primary of the transformer with the load impedance.
9. Use the wattmeter and measure the power into the primary of the transformer.
10. Use the wattmeter and measure the power into the impedance. Compare with the calculated Apparent Power using the measured values.
11. Calculate the total power delivered to the impedance from the secondary of the transformer and the total power delivered to the transformer from the power supply. Compare with the calculated Apparent Power using the measured values.

Report Ideas

Consider the comparisons suggested in the steps above and explain the power, voltage, current, impedance values.

Determine the actual turns ratios of the various transformer configurations and explain.