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# EE114 Power Engineering - I
# Assignment 04

- **Question 1:** A 100 KVA, 6600/330 V single-phase transformer has the effective impedance of 4 + 9j ohm referred to h.v. side. Calculate voltage regulation at full-load 0.8 lagging.
- **Question 2:** A single-phase 50 Hz transformer is to have a no-load voltage ratio 600/250 V. Find the number of turns of each winding if flux is not to exceed 0.05 Wb.
- **Question 3:** The equivalent circuit of a 200/2000 V transformer is shown in Fig. The load on the secondary side is 600 + 500j ohm. Find (a) secondary terminal voltage, (b) primary current and power factor and (c) efficiency.

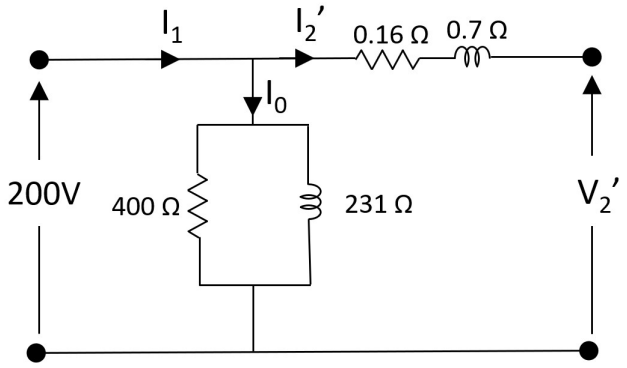


Figure 1

- **Question 4:** Calculate the values of Ro, Xo, Re and Xe in the equivalent circuit referred to low voltage side of a single phase 5 KVA 220/440 V, 50 Hz transformer of which the following are the test results:
  Open circuit: 220 V, 0.8 A, 90 W on the l.v. side (primary).
  Short circuit: 18 V, 8 A, 80 W on the h.v. side (secondary).
- **Question 5:** An ideal 3.3 KV/9.9 KV, 50 Hz transformer having 400 secondary turns.
  1. Calculate the primary turns.
  2. What is the primary current when secondary side is connected to an impedance of 120+23j.

- **Question 6:** A 50 kVA, 1100/300 V transformer is found by the SC test from the 1100 V side to have equivalent resistance 0.039 and equivalent reactance 0.235 X as seen from the HV side. A load impedance of 1.48 + j 1.04 is connected across the secondary.

  1. Find currents in both windings assuming transformer to be ideal.
  2. Calculate voltage regulation of the transformer.

- **Question 7:** A 10 KVA, 1000/250 V transformer has primary and secondary resistance and leakage reactance as below:

| | Resistance | Leakage reactance |
|---|---|---|
| Primary | 0.045 ohm | 0.125 ohm |
| Secondary | 0.084 ohm | 0.625 ohm |

  Calculate the impedance of the transformer referred to HV and LV side. Draw the circuits.

- **Question 8:** A 50 kVA, 900/300 V transformer is subjected to an SC test. The voltage applied on one side, with the other shorted, is 5.2 percentage of the rated voltage. The transformer draws rated current and a power of 242 W during the test.

  1. Compute equivalent resistance and leakage reactance of the transformer in ohms on either side and in pu.
  2. Compute the core flux as a percentage of core flux at rated voltage.
  3. From part (2) justify that all the 242 W constitute ohmic losses.

- **Question 9:** Tests are performed on a single phase, 20 KVA, 1100/110 V, 50Hz transformer:

| | O.C Test (HV side) | S.C test (LV side) |
|---|---|---|
| Voltmeter | 110 V | 50 V |
| Ammeter | 2.2 A | 5 A |
| Wattmeter | 80 W | 170 W |

  1. Derive the parameters for the approximate equivalent circuits referred to the LV side and HV side.
  2. Determine the power factor for the no-load and short-circuit tests.

- **Question 10:** A single-phase, two-winding transformer has 1000 turns on the primary and 500 turns on the secondary. The primary winding is connected to a 220 V supply and the secondary winding is connected to a 5 kVA load. The transformer can be considered ideal.

  1. Determine the load voltage.
  2. Determine the load impedance.
  3. Determine the load impedance referred to the primary.

- **Question 11:** A single-phase transformer has an equivalent leakage reactance of 0.04 per unit. The full-load copper loss is 0.015 per unit and the no-load power loss at rated voltage is 0:01 pu. The transformer supplies full-load power at rated voltage and 0.85 lagging power factor.

  1. Determine the efficiency of the transformer.
  2. Determine the voltage regulation.