

Report

1 A single-phase, 300 kVA, 11 kV/2.2 kV, 60 Hz Transformer has the following equivalent circuit parameters referred to the high voltage side: $R_{htc} = 57.6 \text{ k}\Omega$, $X_m = 16.34 \text{ k}\Omega$, $R_{eq} = 2.78 \Omega$, $X_{eq} = 8.45 \Omega$

Determine:

- No-load current as a percentage of full-load current.
- No-load power loss.
- No-load power factor.
- Full-load copper loss.
- The voltage regulation using the approximate equivalent circuit if the secondary carries a 25% overload current at 85% pf lagging.

2 A 100 kVA, 4400/220V, 50 Hz, single phase transformer has the following parameters:

$R_1 = 0.85 \Omega$, $R_2 = 0.002 \Omega$, $X_{11} = 8 \Omega$, $X_{22} = 0.02 \Omega$
 $R_m = 25000 \Omega$, $X_m = 4000 \Omega$. If the load is such that takes rated current at rated secondary terminal voltage with power factor 0.707 lagging: Determine for referring to L.V side:

- Voltage induced at secondary terminals, no-load current, no-load pf.
- primary current, primary voltage, source pf.
- Transformer efficiency.
- voltage regulation
- draw the phasor diagram

3 Repeat No. 2 for approximate equivalent circuit.

4 Repeat No. 2 for simplified equivalent circuit.

5] A 150 kVA, 2400/240V, 50 Hz Single-phase Transformer has

The following parameters:

$$R_1 = 0.2 \Omega \quad R_2 = 0.002 \Omega \quad X_1 = 0.45 \Omega \quad X_2 = 0.0045 \Omega$$

$$R_c = 10000 \Omega \quad X_m = 1550 \Omega$$

Using the circuit referred to the primary side, determine:

(a) The voltage regulation.

(b) Transformer efficiency.

(c) phasor diagram

} if the transformer operates at rated load with 0.8 pf lagging.

6] Repeat No. 5] for approximate equivalent circuit.

7] Repeat No. 5] for simplified equivalent circuit.

8] A 20 kVA, 8000/480V distribution transformer has the following resistances and reactances:

$$R_1 = 32 \Omega \quad X_1 = 45 \Omega \quad R_m = 250 k\Omega$$

$$R_2 = 0.05 \Omega \quad X_2 = 0.06 \Omega \quad X_m = 30 k\Omega$$

The excitation branch impedances are given referred to H.V side

Find:

(i) The equivalent circuit referred to high voltage side.

(ii) The per-unit equivalent circuit of this transformer.

(iii) Assume that this transformer is supplying rated load at 480V and 0.8 pf lagging. Using the simplified equivalent circuit to determine: input voltage, voltage regulation and its efficiency.