

EE1100 - Transformers

Problem 1

Figure below shows the simplified equivalent circuit (referred to LV side) of a 400/3200V, single phase, 50 Hz, 16 KVA transformer. With the primary voltage kept at 400 V, the HV side is loaded to its rated current at 0.8 pf lag at its terminals. Compute:

1. The terminal voltage at the HV terminals.
2. The LV input current and its pf.
3. The efficiency

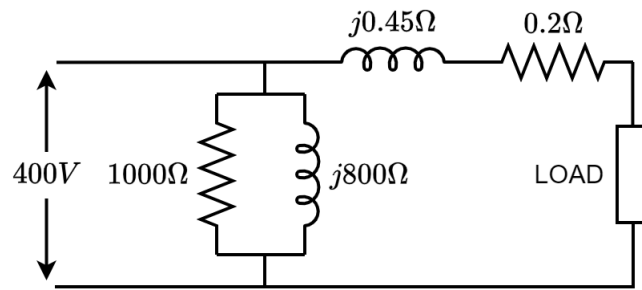


Figure 1: Simplified Equivalent Circuit for Problem 1

Ans: 1. 3062.4V 2. 40.635A, 0.78316 lag 3. 96.229%

Problem 2

A 50 Hz single-phase transformer has a turn ratio of 6. The resistances are $0.90\ \Omega$ and $0.03\ \Omega$, and the reactance $5\ \Omega$ and $0.13\ \Omega$ for high voltage and low voltage windings respectively. Find:

1. The voltage to be applied to the high voltage side to obtain full-load current of 200A on the low-voltage winding on short-circuit
2. The power factor on short circuit

Ans: 1. $329.34\angle 78.44^\circ\text{ V}$ 2. 0.2 lag

Problem 3

A 460/2400V transformer has series leakage reactance 37.2ohms as referred to HV side. A load draws 25KW power at upf on LV side if the voltage on LV side is measured to be 450V then voltage and pf on HV side will be:

Ans: V=2380.97 pf= 0.98 lag

Problem 4

At 400 V and 50 Hz, the total core loss of the transformer was found to be 3200 W. When the transformer is supplied at 200 V and 25 Hz, the total core loss is 1000 W. What will be the eddy current and hysteresis loss at 400 V and 50 Hz?

Ans: Hysteresis loss: 800 W, Eddy current loss: 2400 W