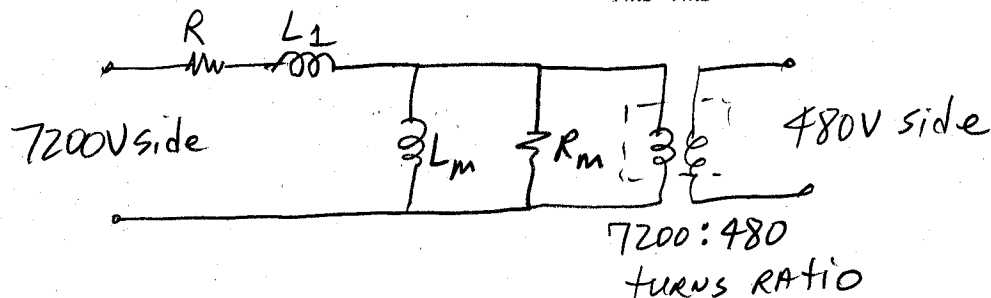


One sheet of notes permitted. Show all steps.

The following data were taken for a 75kVA, 7200/480V transformer:

- Short Circuit Test: 480V side short-circuited, 7200V side energized at reduced voltage. The measurements (on the 7200V side) are $I_{rms} = 10.0A$, $V_{rms} = 144V$, $P = 750W$.
- Open Circuit Test: 7200V side open-circuited, 480V side energized. The measurements (on the 480V side) are $V_{rms} = 480V$, $I_{rms} = 1.50A$, $P = 500W$.

Draw the transformer equivalent circuit with all four circuit parameters (i.e., R , L_1 , L_m , R_m) shown onthe 7200V side. Hint - remember that $S = V_{rms} I_{rms}$, $S^2 = P^2 + Q^2$.

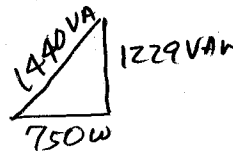
- Short Ckt Test (Measure R , L_1 . Ignore L_m , R_m)

$$S = V_{rms} I_{rms} = 1440 \text{ VA}, \quad P = 750 \text{ W}, \quad Q = \sqrt{S^2 - P^2} = 1229 \text{ VAR}$$

$$I_{rms}^2 R = P, \quad I_{rms}^2 X_1 = Q$$

$$R = \frac{750}{(10)^2} = 7.5 \Omega, \quad X_1 = \frac{1229}{(10)^2} = 12.29 \Omega,$$

$$L_1 = \frac{X_1}{\omega} = 32.6 \text{ mH}$$

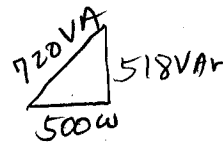


- Open Ckt Test (Measure L_m , R_m . Ignore R , L_1)

$$S = V_{rms} I_{rms} = (480)(1.5) = 720 \text{ VA}, \quad Q = \sqrt{S^2 - P^2} = 518 \text{ VAR}$$

$$\frac{(480)^2}{R_m} = P, \quad \frac{(480)^2}{X_m} = Q$$

on 480 side on 480 side



$$R_m = \frac{(480)^2}{500} = 461 \Omega, \quad X_m = \frac{(480)^2}{518} = 445 \Omega$$

Reflecting to 7200 V side

$$R_m = (461) \left(\frac{7200}{480} \right)^2 = 103.7 \text{ k}\Omega,$$

$$X_m = (445) \left(\frac{7200}{480} \right)^2 = 100.1 \text{ k}\Omega$$

$$L_m = \frac{X_m}{\omega} = 266 \text{ H}$$