7.2 Transformers

Friday, 4 March 2022 3:48 PM

Q1 $V_1 = 12740V$

$V_2 = 240V$

Turns Ratio $\Rightarrow \frac{N_1}{N_2} = \frac{V_1}{V_2}$

$= \frac{12740}{240} = 53.08$

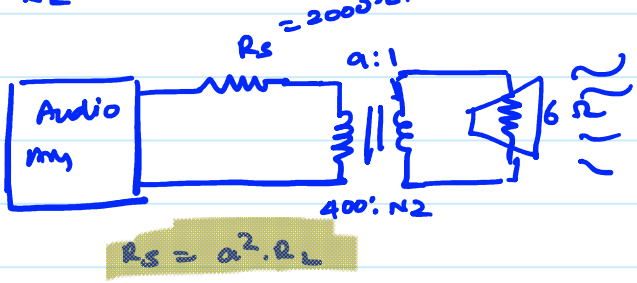
(g) $V_1 = 50V$

$V_2 = 500V$

Turns Ratio $= \frac{50}{500} = 0.1$

Q2 $R_S = 2000\Omega$

$R_L \rightarrow 6\Omega$.



$R_S = a^2 . R_L$

$2000 = a^2 . 6$

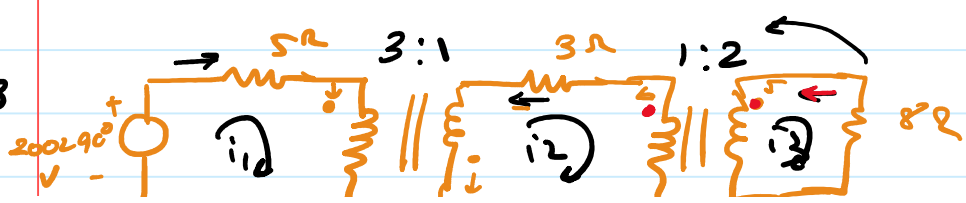
$a = 18.257$.

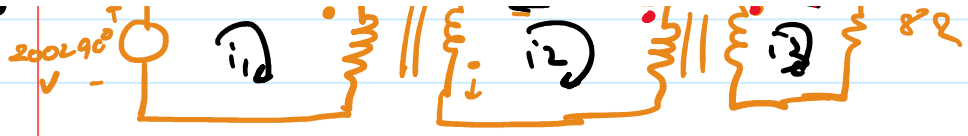
$a = \frac{N_1}{N_2} = \frac{400}{N_2} = 18.257$

$N_2 = \frac{400}{18.257} = 21.9$

$N_2 \simeq 22$.

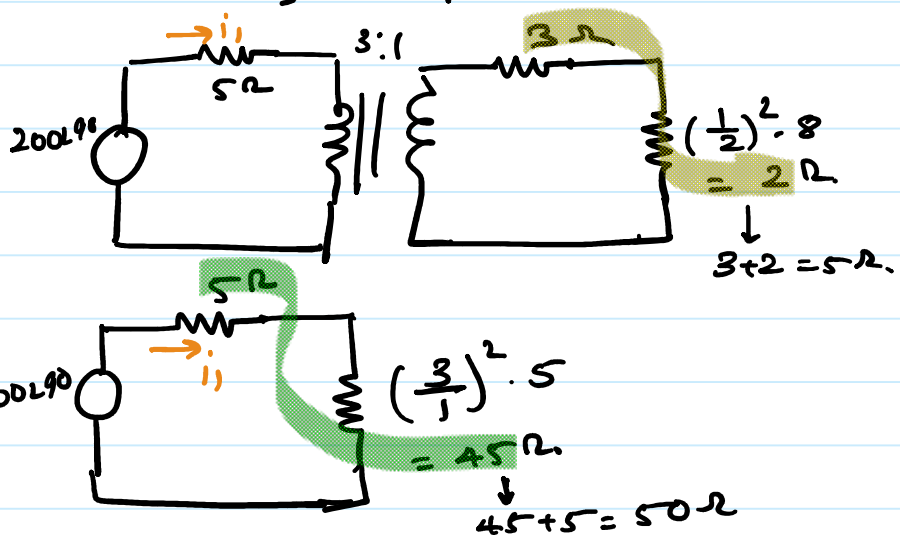
3





→ i_1 and i_2 → 180° phase diffaence

→ i_2 and i_3 → in phase (0°)



$$i_1 = \frac{200\angle 90}{50} = 4\angle 90^\circ$$

$$|i_2| = 4 \times \frac{3}{1} = 12\,A$$

$$i_2 = 12\angle(90+180) = 12\angle 270^\circ = 12\angle -90^\circ\,A$$

$$|i_3| = \frac{1}{2} \times 12 = 6\,A$$

$$i_3 = 6\angle -90^\circ\,A$$

4) 33KVA, 960/120V

	Voltage (V)	Current (A)	Power (W)
SC	68	Irated	300

OC	Vrated	6	320W

S.C. Test → Irated → Primary
→ S.C. Secondary Side.

Rated Apparent Power = 33 KVA.

$V_{1rated} = 960V$

$I_{1rated} = \frac{33 \times 10^3}{960} = 34.375A$

$V_{meas} = 63V$

$Z_{eq} = \frac{V_{meas}}{I_{1rated}} = \frac{63}{34.375} = 1.833\Omega.$

$P = I_{1rated}^2 \cdot R_{eq}$

$\Rightarrow R_{eq} = \frac{800}{(34.375)^2} = 0.25\Omega.$

$X_{eq} = \sqrt{Z^2 - R_{eq}^2} = \sqrt{1.833^2 - 0.25^2}$

$= 1.815\Omega.$

$Z_{eq} = 0.25 + j\,1.815\ \Omega$

→ O.C Test

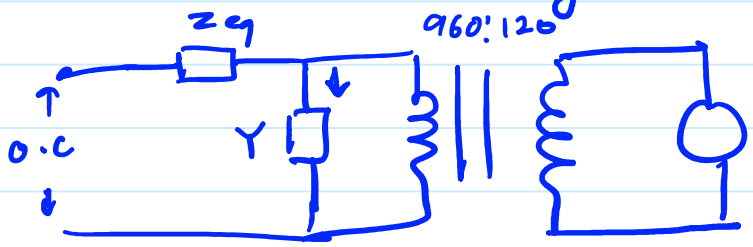
Apply Rated Voltage @ secondary.

O.C. → Primary.

→ Measurements are @ secondary.

Z_{eq} ——— 960:120 ———→

→ Measurements are @ secondary.



$V_{2rated} = 120V$

$V_{1rated} = 960V$

$I_2 = 6$

$I_1 = 6 \cdot \left(\frac{120}{960}\right) = 0.75\,A.$

$|Y| = \frac{I_1}{V_{1rated}} = \frac{0.75}{960} = 0.00078\,\mho$

$P_2 = 320W = P_1$

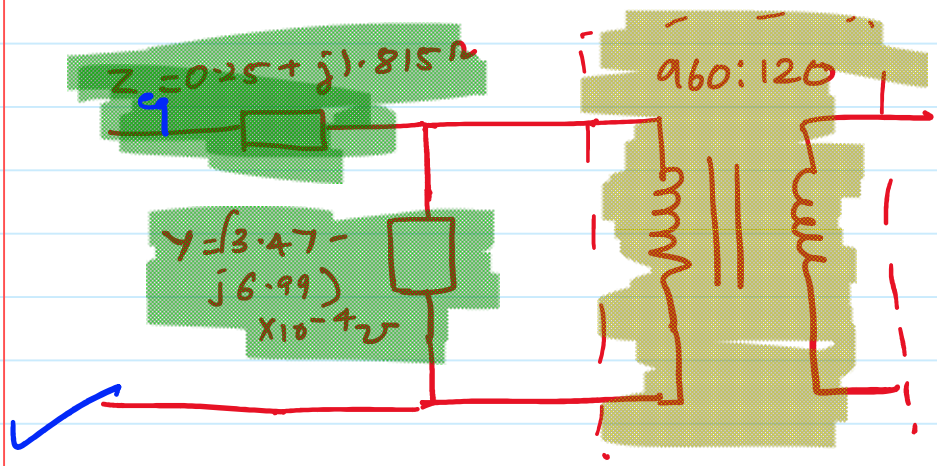
$P_1 = V_{1rated}^2 \cdot G$

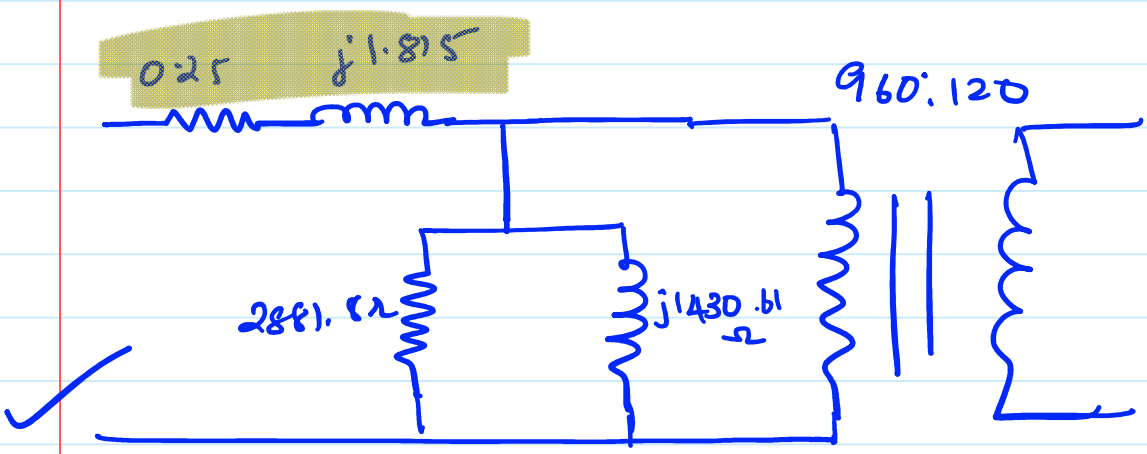
$G = \frac{320}{960^2} = 0.000347\,\mho = \frac{1}{R_m}$

$R_m = \frac{1}{G} = 2881.8\,\Omega.$

$B = \sqrt{Y^2 - G^2} = 0.000699\,\mho = \frac{1}{X_m}$

$X_m = 1430.61\,\Omega.$





→ Principles of Transformers

→ Application.

→ Practical Transformer

→ Parameter Test → Zeq → S.C. Test
→ Y → O.C Test