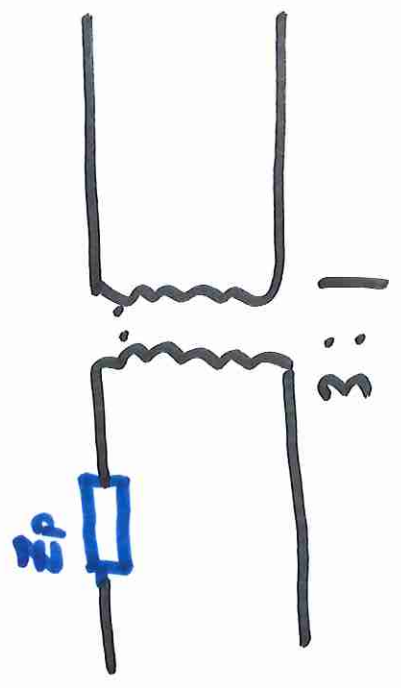
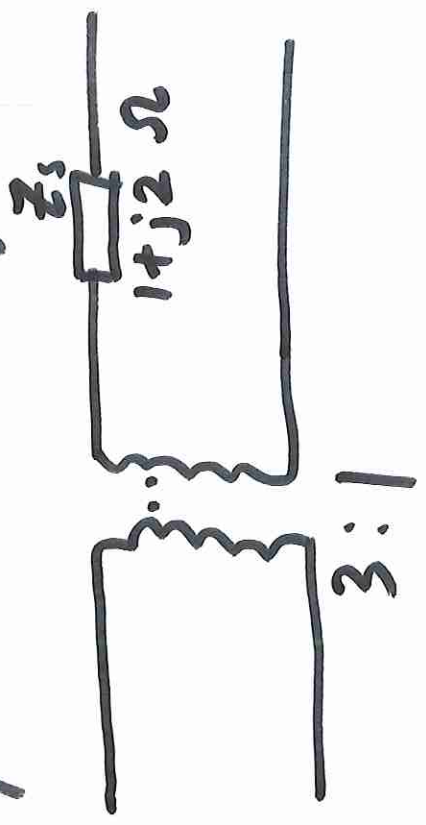
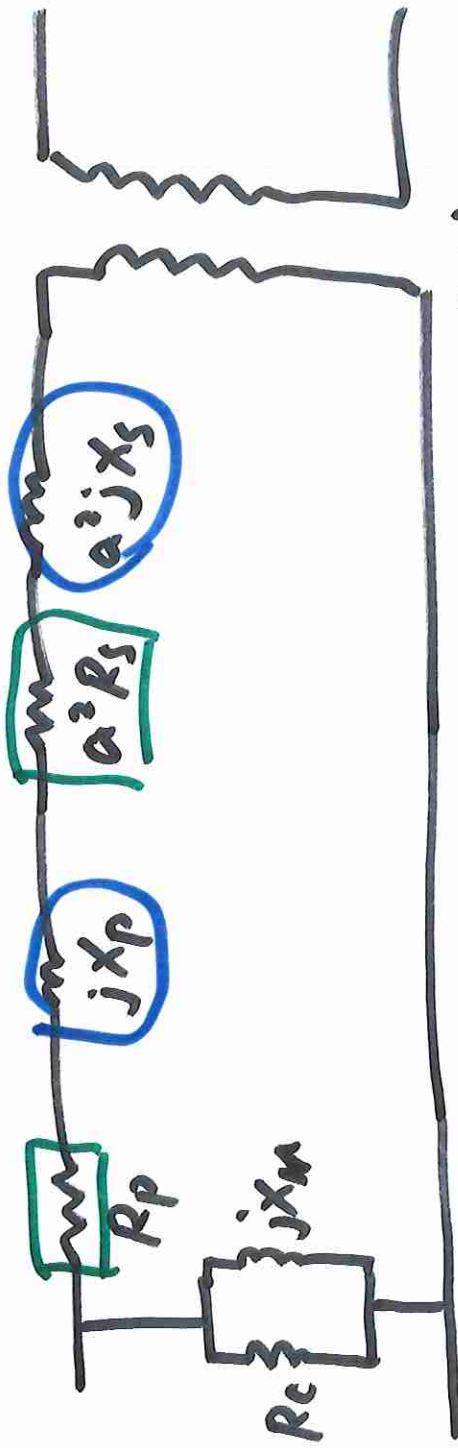


Impedance Transformation



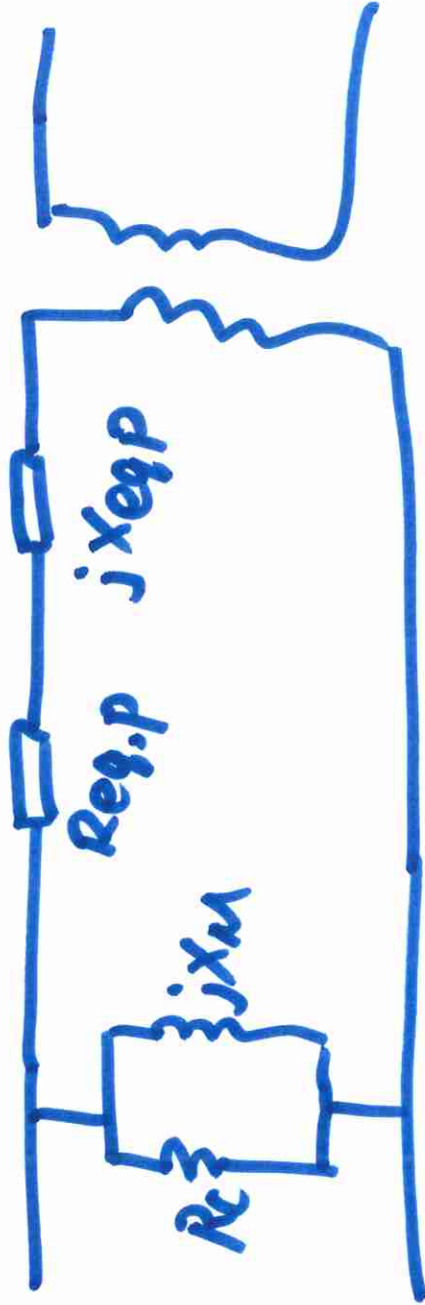
$$\begin{aligned} Z_p &= a^2 Z_s \\ &= 9(1 + j2) \\ &= 9 + j18 \Omega \end{aligned}$$



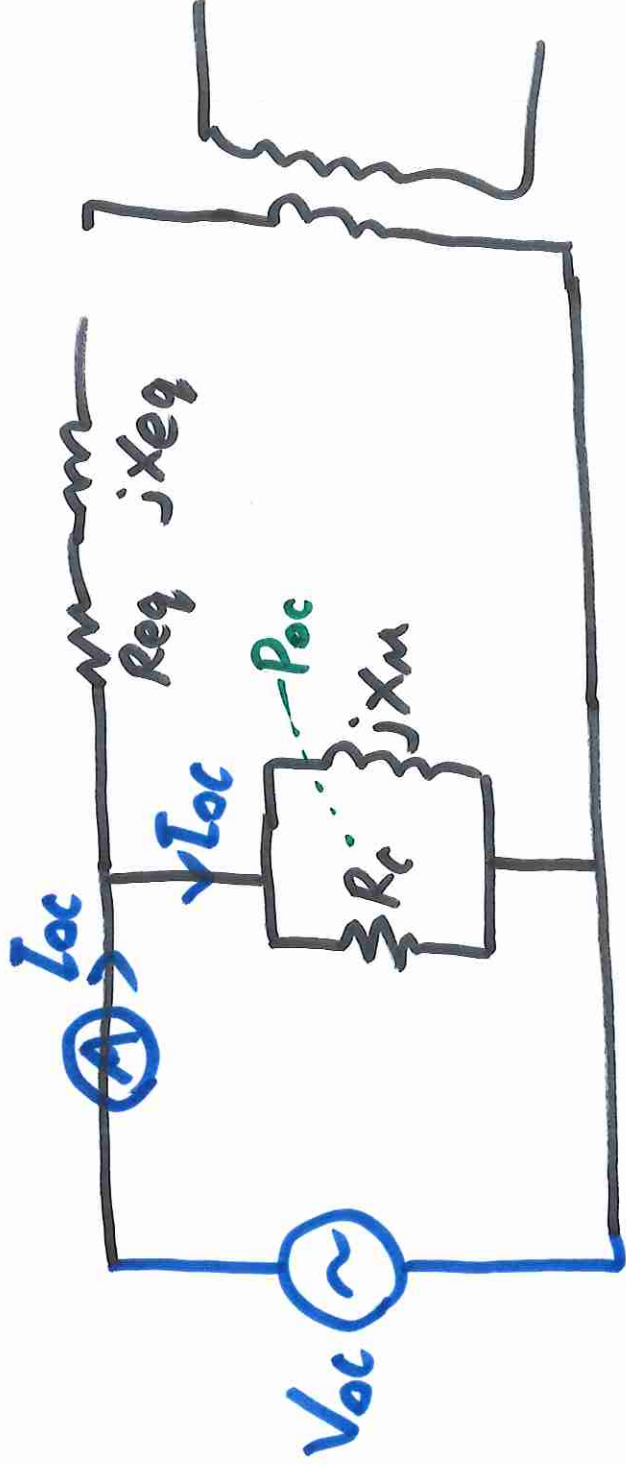
$a:1$

$$R_p + a^2 R_s = R_{eqP}$$

$$jX_p + a^2 jX_s = jX_{eqP}$$



Open Circuit Test

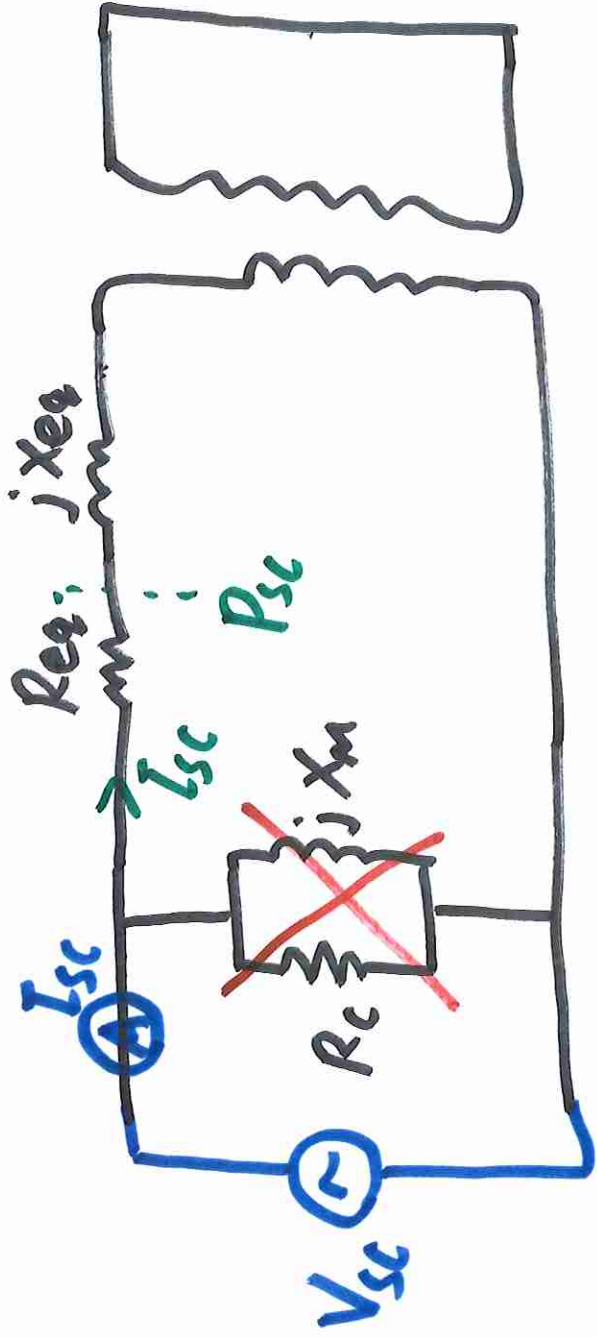


$$|S_{oc}| = |V_{oc}| |I_{oc}|$$

$$PF = \frac{P_{oc}}{|S_{oc}|} = \frac{P_{oc}}{|V_{oc}| |I_{oc}|} = \cos \theta \Rightarrow \theta = \arccos \left(\frac{P_{oc}}{|V_{oc}| |I_{oc}|} \right)$$

$$Y_{oc} = \frac{|I_{oc}|}{|V_{oc}|} \angle -\theta = A + jB = \frac{1}{R_c} + \frac{1}{jX_m} = \frac{1}{R_c} - j \frac{1}{X_m}$$

$$\Rightarrow \frac{1}{R_c} = A, \quad -\frac{1}{X_m} = B$$



Short-Circuit Test

$$|S_{sc}| = |V_{sc}| |I_{sc}|$$

$$PF = \frac{P_{sc}}{|S_{sc}|} = \frac{P_{sc}}{|V_{sc}| |I_{sc}|} = \cos \theta \Rightarrow \theta = \cos^{-1}(PF)$$

$$Z_{sc} = \frac{|V_{sc}|}{|I_{sc}|} \angle \theta = [C] + j[D] = R_{eq} + jX_{eq} \Rightarrow R_{eq} = C, X_{eq} = D$$