

$$I_{\text{load}} = I_{\text{line}} \times 10 \quad \frac{|V_{\text{load}}|}{|V_G|} = 99.9\%$$

$$V_{\text{load}} = I_{\text{load}} \cdot Z_{\text{load}} \quad P_{\text{load}} = |I_{\text{load}}|^2 R_{\text{load}}$$

$$V_{\text{load}} \approx 13.785 \angle -0.027^\circ \text{ kV}$$

$$I_{\text{line}} = \frac{I_G}{10} = 2.757 \angle -36.9^\circ \text{ A}$$

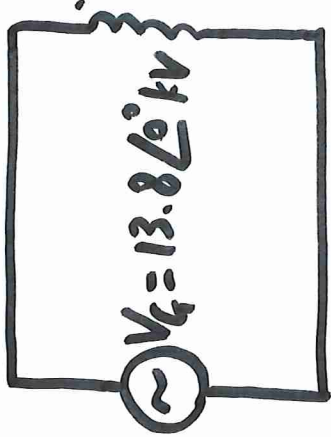
$$I_G = \frac{13.8 \angle 0^\circ \text{ kV}}{0.6 \angle 60^\circ \Omega + 500 \angle 36.87^\circ \Omega} = 27.57 \angle -36.9^\circ \text{ A}$$

$$P_{\text{in}} = \frac{P_{\text{load}} + P_{\text{loss}}}{P_{\text{in}}} \times 100\% = \frac{P_{\text{load}}}{P_{\text{load}} + P_{\text{loss}}} \times 100\%$$

$S_{base} = 100 \text{ kVA}$

Using Per-unit

$1:10$ $Z_{line} = 6 \angle 60^\circ \Omega$ $10:1$



$Z_{load} = 500 \angle 36.87^\circ \Omega$

$V_{b1} = 13.8 \text{ kV}$

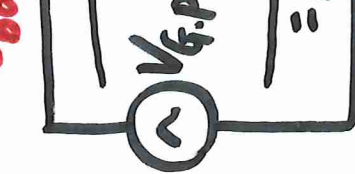
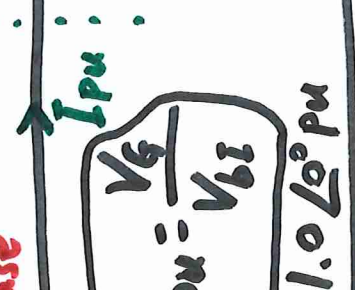
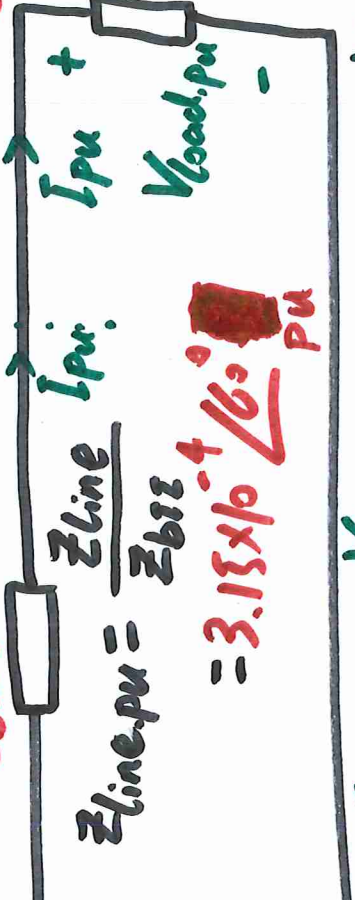
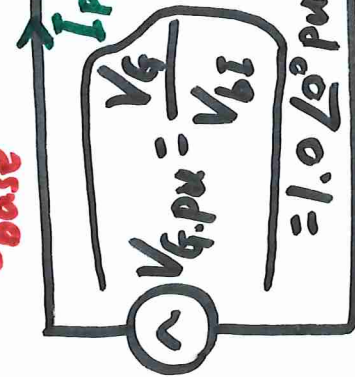
$V_{b22} = 13.8 \text{ kV}$

$Z_{b1} = \frac{V_{b1}^2}{S_{base}}$

$Z_{b22} = \frac{V_{b22}^2}{S_{base}} = 190.44 \Omega$

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$S_{base} = 0.263 \angle 36.87^\circ \text{ pu}$



$I_{b1} = S_{base} / V_{b1} = 7.25 \text{ A}$

$I_{pu} = \frac{V_G \text{ pu}}{Z_{line \text{ pu}} + Z_{load \text{ pu}}} = 1.0 \angle 0^\circ$

$I_G = I_{pu} \cdot I_{b1}$

$= 27.5 \angle 36.9^\circ \text{ A}$

$V_{load \text{ pu}} = I_{pu} \cdot Z_{load \text{ pu}} = 0.99 \angle 6.027^\circ \text{ pu}$

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$= 3.8 \angle 36.9^\circ \text{ pu}$