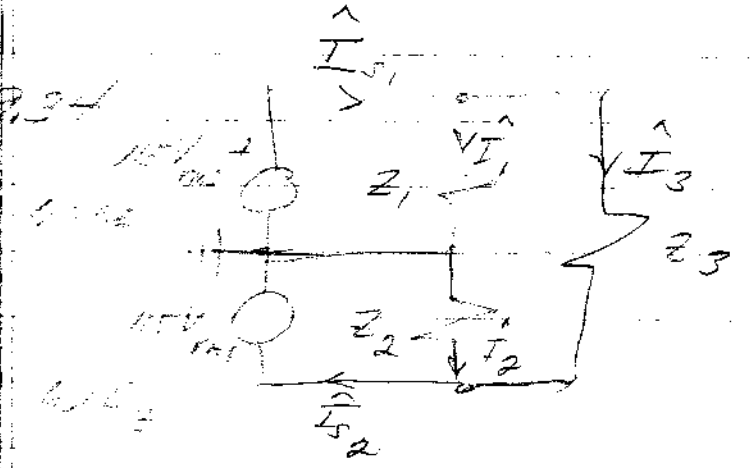
EE 212 Homework 1

$P = VI\cos\theta$



for Z_1 $\begin{cases} P = 500\,W \\ pf = 0.8 \text{ lagging} \end{cases}$

for Z_2 $\begin{cases} P = 1000\,W \\ pf = 0.9 \text{ lagging} \end{cases}$

for Z_3 $\begin{cases} P = 1500\,W \\ pf = 0.95 \text{ leading} \end{cases}$

$|\hat{I}_1| = \frac{500}{115 \times 0.8} = 5.435$; $\theta = \cos^{-1} 0.8 = 36.87°$

$\therefore \hat{I}_1 = 5.435\angle -j36.87°$

$\hat{I}_2 = \frac{1000}{115 \times 0.9} \angle -j\cos^{-1}(0.9) = 9.66\angle -j25.84°$

$\hat{I}_3 = \frac{1500}{230 \times 0.95} \angle +j\cos^{-1}(0.95) = 6.865\angle j18.19°$

$\hat{I}_{S_1} = \hat{I}_1 + \hat{I}_3 = 4.348 - j3.261 + 6.522 + j2.143$

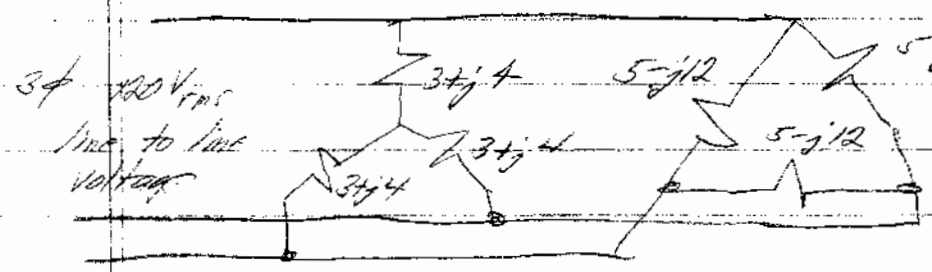
$\hat{I}_{S_1} = \boxed{10.87 - j1.118} = 10.92\angle -j5.77°$

$\hat{I}_{S_2} = \hat{I}_2 + \hat{I}_3 = 8.694 - j4.21 + 6.522 + j2.143 = 15.22 - j2.07$

$\hat{I}_{S_2} = 15.36\angle -j7.75°$

EE 212 Homework 2

P 4.44



convert Y load to delta $Z_\Delta = 3Z_Y = 9+j12$

this gives a Δ connected load with each impedance $= \frac{(9+j12)(5-j12)}{14} = \frac{(45+144)+j(-48)}{14}$

$\therefore Z_{\Delta_{total}} = 13.5 - j3.429 = 13.93 \angle -j14.25°$

$pf = \cos(14.25) = 0.97$

$\hat{I}_{rms} = \frac{120}{13.93 \angle -j14.25} = 8.615 \angle j14.25$

$P_{/phase} = |\hat{I}_{rms}|^2 \times 13.5 = 1001.9$ Watts

total $P = 3 P_{/phase} = \boxed{3005.8\ W}$ ←

or $P_{/phase} = V_{rms} I_{rms} \cos\theta = 120 \times 8.615 \cos(14.25°) = 1001.99$