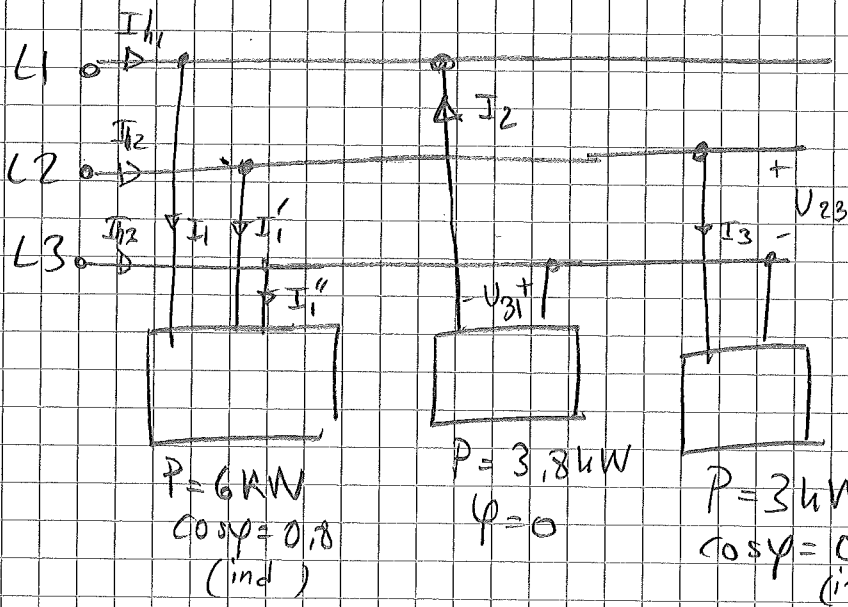


10:3

2.13



$$U_h = 400$$

$$P = 6 \text{ kW}$$

$$\cos \varphi = 0,8$$

$$(\text{ind})$$

$$\varphi = 36,9^\circ$$

$$P = 3,8 \text{ kW}$$

$$\varphi = 0$$

$$P = U_h \cdot I_2 \cdot \cos \varphi$$

$$I_2 = 9,5 \text{ A}$$

$$I_2 = 9,5 e^{-j210^\circ}$$

$$P = 3 \text{ kW}$$

$$\cos \varphi = 0,85$$

$$(\text{ind})$$

$$\varphi = 31,8^\circ$$

$$P = U_h \cdot I_3 \cdot \cos \varphi$$

$$I_3 = 8,82 \text{ A}$$

$$I_3 = 8,82 e^{-j21,8^\circ}$$

$$P = \sqrt{3} \cdot U_h \cdot I_h \cdot \cos \varphi$$

$$I_{h1} = 10,82 \text{ A}$$

$$I_1 = 10,82 e^{j36,9^\circ}$$

$$I_1' = 10,82 e^{-j156,9^\circ}$$

$$I_1'' = 10,82 e^{-j276,9^\circ}$$

$$\text{KCL: } I_{h1} = I_1 = I_2 = 10,82 (\cos(-36,9^\circ) + j \sin(-36,9^\circ))$$

$$+ 9,5 (\cos(-210^\circ) + j \sin(-210^\circ)) = 16,9 - j11,2$$

$$\Rightarrow \sqrt{16,9^2 + 11,2^2} e^{j \arctan\left(\frac{-11,2}{16,9}\right)} = 20,3 e^{-j33,5^\circ} \text{ [A]}$$

$$\text{KCL: } I_{h2} = I_1' + I_3 = 10,82 e^{-j156,9^\circ} + 8,82 e^{-j121,8^\circ}$$

$$= 10,82 (\cos(-156,9^\circ) + j \sin(-156,9^\circ)) + 8,82 (\cos(-121,8^\circ) + j \sin(-121,8^\circ))$$

$$= -14,6 + j11,7 = 18,7 e^{j218,7^\circ} \text{ [A]}$$

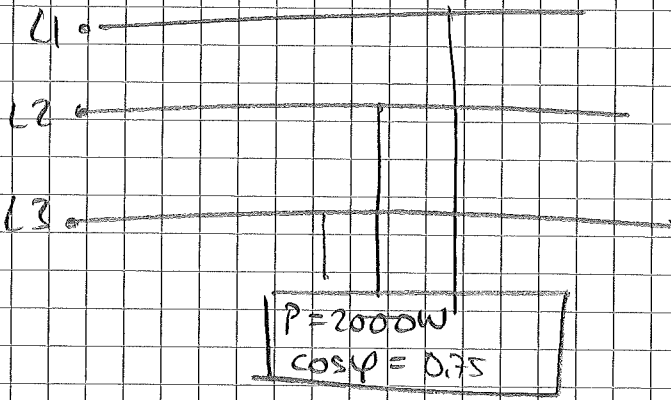
$$\text{KCL: } I_{h3} = I_1'' - I_3 + I_2 = 10,82 (\cos(-276,9^\circ) + j \sin(-276,9^\circ)) -$$

$$- 8,82 (\cos(-121,8^\circ) + j \sin(-121,8^\circ)) + 9,5 (\cos(-210^\circ) + j \sin(-210^\circ))$$

$$= -2,3 + j23,0 = 23,1 e^{j95,9^\circ} \text{ [A]}$$

F0:3

2.20



$$\varphi = 41,4^\circ$$

$$Q_f = \tan \varphi \cdot P = 1763 \text{ kVAR}$$

ansker:

$$P = 2000 \text{ kW}$$

$$\cos \varphi = 0,95$$

$$\varphi = 18,2$$

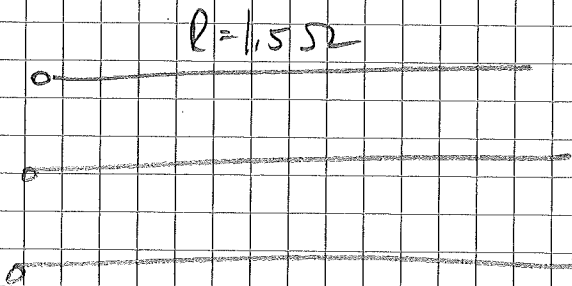
$$Q_e = \tan \varphi \cdot P = 657 \text{ kVAR}$$

$$Q = Q_f - Q_e = 1763 - 657 = 1106 \text{ kVAR}$$

a)

$$U_H = 10500 \text{ V}$$

b)



Före:

$$P = \sqrt{3} \cdot U_H \cdot I_H \cdot \cos \varphi$$

$$P = 3 \cdot R \cdot I_H^2 = 96,7 \text{ kW}$$

$$I_H = \frac{P}{\sqrt{3} \cdot U_H \cdot \cos \varphi} = \frac{2000 \text{ kW}}{\sqrt{3} \cdot 10500 \cdot 0,75} \approx 146,6 \text{ A}$$

Efter:

$$I_H = \frac{P}{\sqrt{3} \cdot U_H \cdot \cos \varphi} = \frac{2000 \text{ kW}}{\sqrt{3} \cdot 10500 \cdot 0,95} \approx 115,8 \text{ A}$$

$$P = 3 \cdot R \cdot I_H^2 = 60,3 \text{ kW}$$

$$Q_c = 3 \cdot \frac{1}{\omega C} \cdot \frac{I_f^2}{\sqrt{3}} = 1106 \text{ kVar}$$

$$C = \frac{I_H^2}{\omega \cdot Q_c} = \frac{115,8^2}{2\pi \cdot 50 \cdot 1106 \text{ k}} \approx 10,6 \mu\text{F}$$

