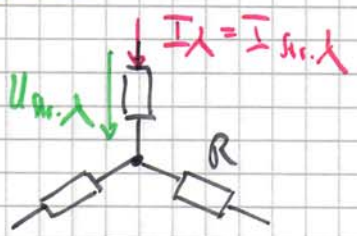
1. Aufgabe

a)



$P_\lambda = \sqrt{3} \cdot U \cdot I_\lambda \cdot \cos\varphi$

$I_\lambda = \dfrac{P}{\sqrt{3} \cdot U \cdot \cos\varphi}$ (3)

$I_\lambda = \dfrac{7000\,W}{\sqrt{3} \cdot 400V \cdot 0{,}842} = 12\,A$

$I_{Str.\lambda} = I_\lambda = 12\,A$ (2)

$S_\lambda = \dfrac{P_\lambda}{\cos\varphi} = \dfrac{7000\,VA}{0{,}842}$

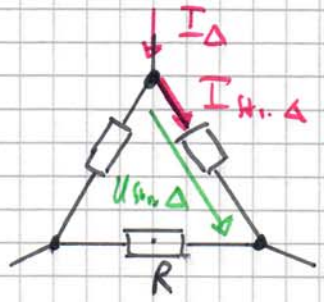
$= 8{,}314\,kVA$ (2)

$Q_\lambda = \sqrt{S_\lambda^2 - P_\lambda^2} = 4{,}485\,kVar$ (2)

$C_\lambda = \dfrac{Q_\lambda}{3\omega U^2} = \dfrac{4485\,VA}{3 \cdot 100\pi\,s^{-1} \cdot 400^2\,V^2}$

$C_\lambda = 29{,}74\,\mu F$ (3)

b)



$U_{Str\Delta} = \sqrt{3} \cdot U_{Str.\lambda}$

$\Rightarrow I_{Str.\Delta} = \sqrt{3} \cdot I_{Str.\lambda}$

$I_{Str.\Delta} = 20{,}78\,A$ (2)

$I_\Delta = \sqrt{3} \cdot I_{Str.\Delta} = 36\,A$ (2)

$S_\Delta = 3 \cdot S_\lambda = 24{,}94\,kVA$ (1)

$Q_\Delta = 3 \cdot Q_\lambda = 13{,}45\,kVar$ (1)

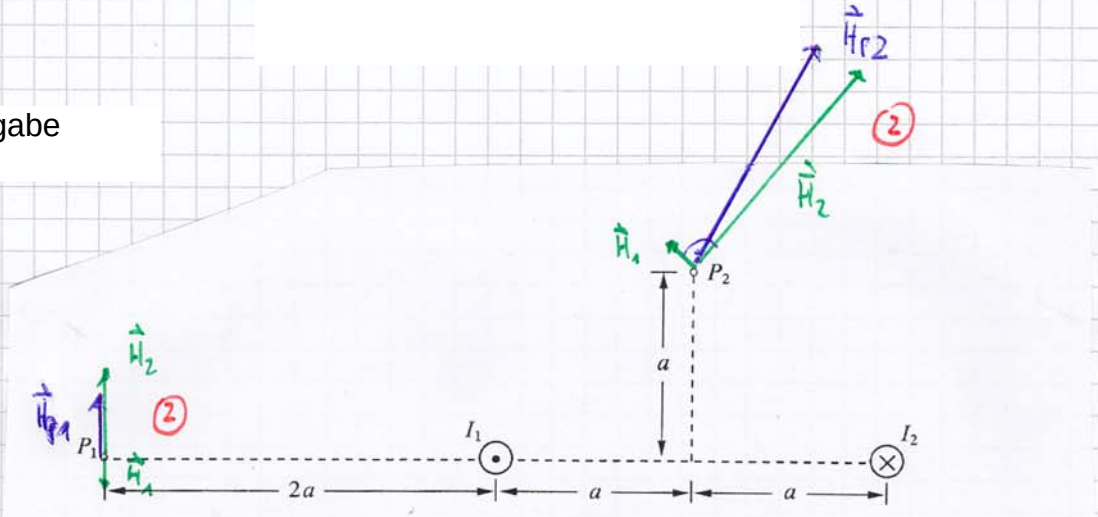
c) $\omega C \cdot U^2 = \dfrac{Q}{3}$

$C = \dfrac{Q}{3\omega U^2}$

$C_\Delta = \dfrac{Q_\Delta}{3\omega U^2} = \dfrac{3 \cdot Q_\lambda}{3\omega U^2}$

$C_\Delta = 3 \cdot C_\lambda = 89{,}23\,\mu F$ (2)

2. Aufgabe



$$I = \oint \vec{H} \cdot d\vec{s} = H \cdot 2\pi r \quad \Rightarrow \quad H = \frac{I}{2\pi r}$$

P_1

$$H_1 = \frac{I_1}{2\pi \cdot 2a} = \frac{1\,A}{2\pi \cdot 2 \cdot 39{,}79\,cm} = 0{,}2\ A/m \quad (3)$$

$$H_2 = \frac{I_2}{2\pi \cdot 4a} = \frac{7\,A}{2\pi \cdot 4 \cdot 39{,}79\,cm} = 0{,}7\ A/m \quad (2)$$

$$H_2 - H_1 = 0{,}5\ A/m = H_{P1} \quad (2)$$

P_2

$$H_1 = \frac{I_1}{2\pi \cdot \sqrt{2}a} = \frac{1A}{2\pi\sqrt{2} \cdot 39{,}79\,cm} = 0{,}283\ A/m \quad (3)$$

$$H_2 = \frac{I_2}{2\pi\sqrt{2}a} = \frac{7A}{2\pi \cdot \sqrt{2} \cdot 39{,}79\,cm} = 1{,}780\ A/m \quad (2)$$

$$H_{P2} = \sqrt{H_1^2 + H_2^2} = 2{,}00\ A/m \quad (4)$$