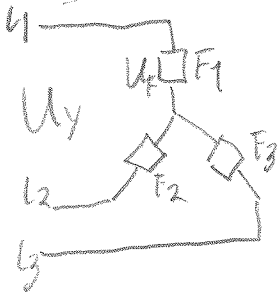
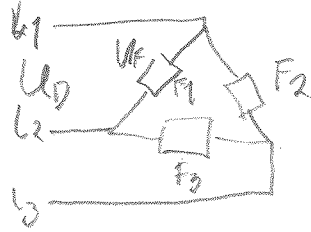


1) a) $U_Y = \sqrt{3} \cdot U_F$

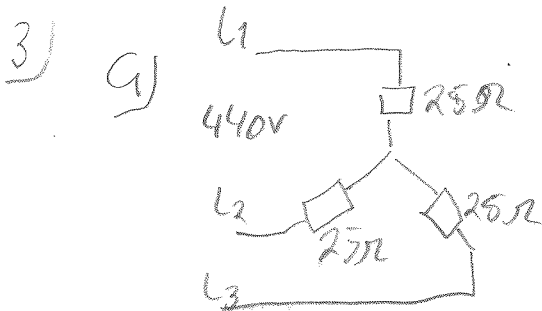


b) $U_{\Delta} = U_F$



2) a) $I_{\lambda} = I_F$

b) $I_D = \sqrt{3} \cdot I_F$

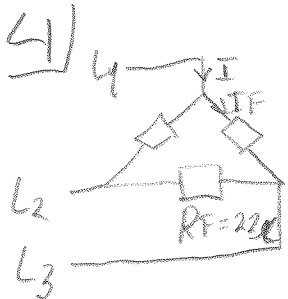


$$U_F = \frac{U_Y}{\sqrt{3}} = \frac{440V}{\sqrt{3}} = 254V$$

$$I_F = \frac{U_F}{R_F} = 10,16A \quad \underline{\underline{I_Y = I_F = 10,16A}}$$

b) $P = U \cdot I \cdot \sqrt{3} = 440V \cdot 10,16A \cdot \sqrt{3} = 7743W$

c) $P_D = 3 \cdot P_Y = 3 \cdot 7743W = 23229W$



$$U_F = U_{\Delta} = 400V$$

$$I_F = \frac{U_F}{R_F} = \frac{400V}{22\Omega} = \underline{\underline{18,18A}}$$

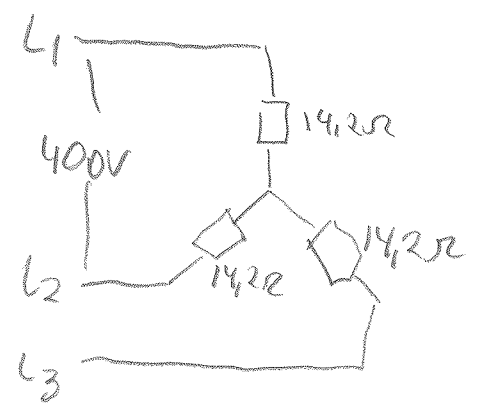
$$I_{\Delta} = \sqrt{3} \cdot I_F = \sqrt{3} \cdot 18,18A = \underline{\underline{31,5A}}$$

5) a) $I_Y = I_F$

$$U_F = \frac{U_Y}{\sqrt{3}} = \frac{400V}{\sqrt{3}} = 230,94V$$

$$I_F = \frac{U_F}{R_F} = \frac{230,94V}{14,2\Omega} = 16,26A$$

$I_H = 16,26A$



b) $P_F = U_F \cdot I_F = 230,94V \cdot 16,26A = \underline{3756W}$

$$P_H = 3 \cdot P_F = 3756W \cdot 3 = \underline{11268W}$$

$$E_{ta} P = U \cdot I \cdot \sqrt{3} \cdot \cos \varphi = 400V \cdot 16,26A \cdot \sqrt{3} \cdot 1 = \underline{11266W}$$

$$U_F = 400V \cdot 0,95 = 380V$$

$$\Leftrightarrow U_F = \frac{U_H}{\sqrt{3}} = \frac{380V}{\sqrt{3}} = 219,39V$$

$$I_F = I_H = \frac{U_F}{R_F} = \frac{219,39V}{14,2\Omega} = 15,45A$$

$$P_H = U \cdot I \cdot \sqrt{3} \cdot \cos \varphi = 380V \cdot 15,45A \cdot \sqrt{3} \cdot 1 = 10169W$$

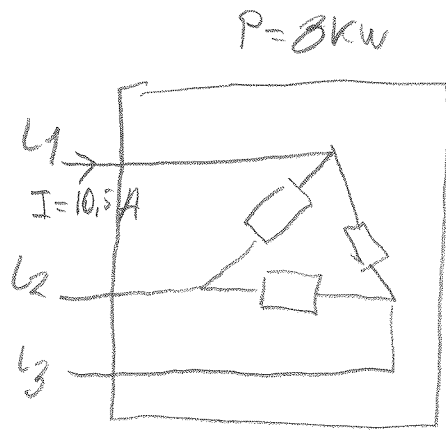
$$\frac{10169W}{11266W} \cdot 100 = 0,90 \Leftrightarrow$$

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6) a) $P = U \cdot I \cdot \sqrt{3}$

$\Leftrightarrow U = \frac{P}{I \cdot \sqrt{3}} = \frac{8 \cdot 10^3 \text{ W}}{10,5 \text{ A} \cdot \sqrt{3}} = 439,9 \text{ V}$

$U_F = U_\Delta \Leftrightarrow U_F = \underline{\underline{439,9 \text{ V}}}$

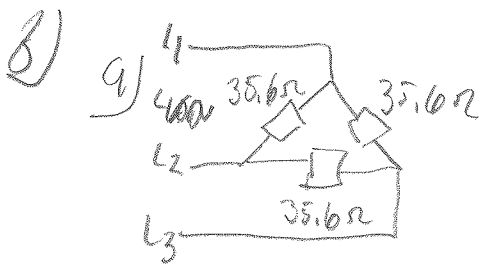
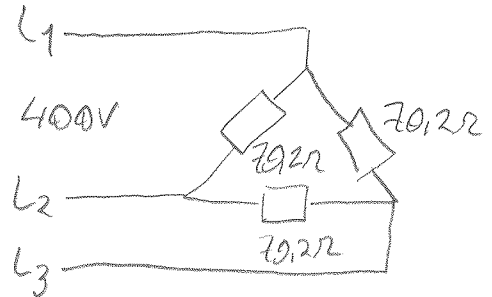


7) a) $U_F = U_\Delta \Leftrightarrow I_F = \frac{U_\Delta}{R_F} = \frac{400 \text{ V}}{70,2 \Omega} = \underline{\underline{5,7 \text{ A}}}$

b) $I_\Delta = I_F \sqrt{3} = 5,7 \text{ A} \cdot \sqrt{3} = \underline{\underline{9,87 \text{ A}}}$

c) $P_F = U_F \cdot I_F = 400 \text{ V} \cdot 5,7 \text{ A} = \underline{\underline{2280 \text{ W}}}$

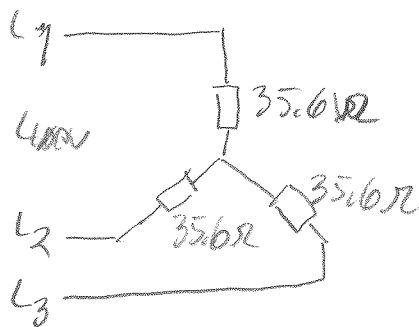
d) $P_H = 3 \cdot 2280 \text{ W} = \underline{\underline{6840 \text{ W}}}$



$I_F = \frac{U_F}{R_F} = \frac{400 \text{ V}}{35,6 \Omega} = 11,24 \text{ A}$

$I_H = \sqrt{3} \cdot I_F = \sqrt{3} \cdot 11,24 \text{ A} = \underline{\underline{19,46 \text{ A}}}$

b) $P_H = U \cdot I \cdot \sqrt{3} = 400 \text{ V} \cdot 19,46 \text{ A} \cdot \sqrt{3} = \underline{\underline{13482 \text{ W}}}$



$I_F = I_H \quad ; \quad U_F = \frac{U_L}{\sqrt{3}}$

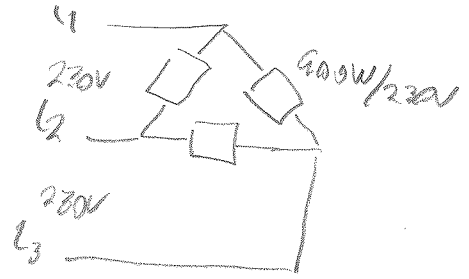
$I_F = \frac{U_F}{R_F} = \frac{(400 \sqrt{3})}{35,6 \Omega} = 6,49 \text{ A}$

$I_H = \underline{\underline{6,49 \text{ A}}}$

$P_H = 400 \text{ V} \cdot 6,49 \cdot \sqrt{3} = \underline{\underline{4496 \text{ W}}}$

a)

$$a) P = \frac{U^2}{R} \Leftrightarrow R = \frac{U^2}{P} \Leftrightarrow R = \frac{(230V)^2}{900W} = \underline{\underline{58,8\Omega}}$$



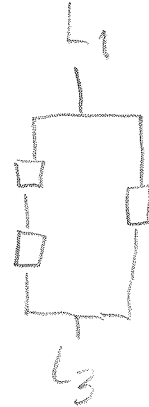
b) $P = 3 \cdot 900W = 2700W$

c) $P = I \cdot U \cdot \sqrt{3} \Leftrightarrow I = \frac{P}{U \cdot \sqrt{3}} = \frac{2700W}{230V \cdot \sqrt{3}} = \underline{\underline{6,78A}}$

d) $R_H = \frac{(R_1 + R_2) \cdot R_3}{R_1 + R_2 + R_3} = \frac{(58,8\Omega + 58,8\Omega) \cdot 58,8\Omega}{3 \cdot 58,8\Omega}$

$R_H = \underline{\underline{39,2\Omega}}$

$I_H = \frac{230V}{39,2\Omega} = \underline{\underline{5,87A}}$



$P = I \cdot U = 5,87A \cdot 230V = \underline{\underline{1349,5W}}$

101

a) $P = \frac{U^2}{R} \Leftrightarrow R = \frac{U^2}{P} = \frac{230^2}{900W} = \underline{\underline{58,8\Omega}}$

b) $P_H = 3 \cdot P_f = 3 \cdot 900W = \underline{\underline{2700W}}$

c) $R_H = R_1 + R_2 = 58,8\Omega + 58,8\Omega = 117,6\Omega$

$I_H = \frac{U_H}{R_H} = \frac{400}{117,6\Omega} = 3,40A$

$P_H = U \cdot I = 400V \cdot 3,40A = \underline{\underline{1360W}}$

c) $I = I_f = \frac{U_f}{R_f} = \frac{230V}{58,8\Omega}$

$I = \underline{\underline{3,91A}}$

$$11) R_1 = \frac{U^2}{P_1} = \frac{230^2}{1000W} = 52,9\Omega \quad ; \quad R_2 = \frac{U^2}{P_2} = \frac{230^2}{1200W} = 44,08\Omega$$

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$$R_H = R_1 + R_2 = 52,9\Omega + 44,08\Omega = \underline{96,98\Omega}$$

$$I_H = \frac{U_H}{R_H} = \frac{400V}{96,98\Omega} = \underline{4,12A}$$



$$U_{P_1} = I \cdot R_1 = 4,12A \cdot 52,9\Omega = \underline{218,2V}$$

$$U_{P_2} = I \cdot R_2 = 4,12A \cdot 44,08\Omega = \underline{181,9V}$$

$$12) I_n = 10A$$

$$I_\Delta = I_f \cdot \sqrt{3} \Leftrightarrow I_f = \frac{I_\Delta}{\sqrt{3}}$$

$$I_3 = I_f \Leftrightarrow I_3 = \frac{10A}{\sqrt{3}} = 5,77A$$

$$13) I_f = \frac{I_H}{\sqrt{3}} = \frac{13,8A}{\sqrt{3}} = \underline{7,97A}$$

$$U = U_f \Leftrightarrow U = I_f \cdot R_f = 7,97A \cdot 55\Omega$$

$$\underline{U = 438V}$$

