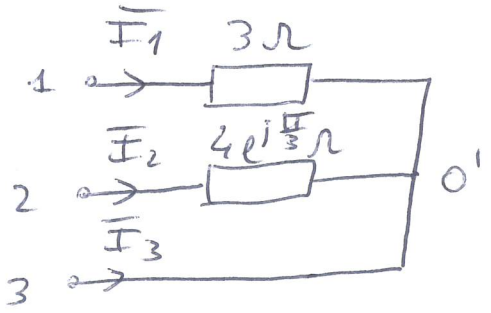
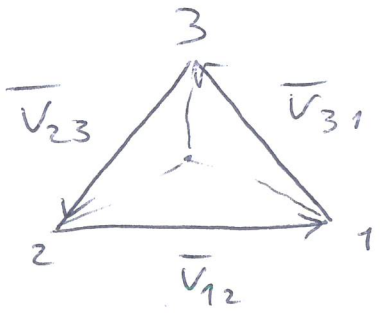
TRIFASE 1

1)





$$V_e = 240\ V$$

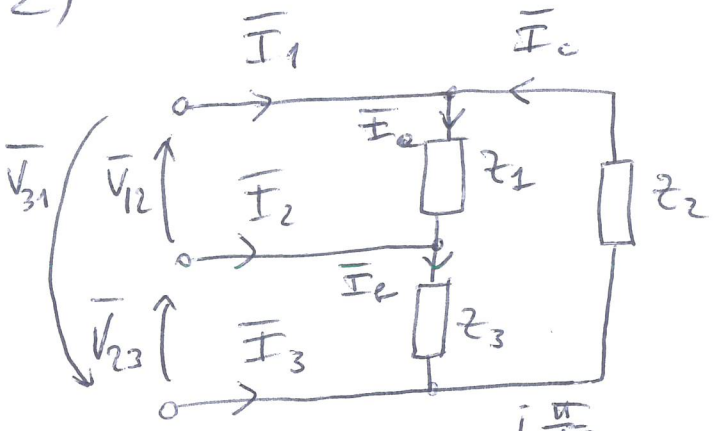
$$\bar{I}_1 = \frac{-\bar{V}_{31}}{3} = \frac{-240e^{j\frac{2}{3}\pi}}{3} = -80e^{-j\frac{2}{3}\pi}\ A$$

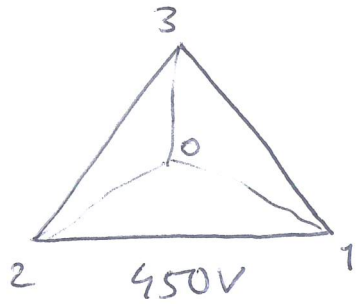
$$\bar{I}_2 = \frac{\bar{V}_{23}}{4e^{j\frac{\pi}{3}}} = \frac{240e^{-j\frac{2}{3}\pi}}{4e^{j\frac{\pi}{3}}} = 60e^{-j\pi} = -60\ A$$

$$\bar{I}_3 = -\bar{I}_1 - \bar{I}_2 = 80e^{j\frac{2}{3}\pi} + 60 = 20 + j\,69\ A$$

TRIFASE 1

2)





$$z_1 = 5e^{j\frac{\pi}{18}}\ \Omega$$

$$z_2 = 9e^{j\frac{\pi}{6}}\ \Omega$$

$$z_3 = e^{j\pi\frac{4}{9}}\ \Omega$$

$$\bar{I}_1 = \underbrace{\frac{\bar{V}_{12}}{z_1}}_{\bar{I}_a} - \underbrace{\frac{\bar{V}_{31}}{z_2}}_{\bar{I}_c} = 450\left(\frac{1}{5e^{j\pi/18}} - \frac{e^{j\frac{2}{3}\pi}}{9e^{j\frac{\pi}{6}}}\right) =$$

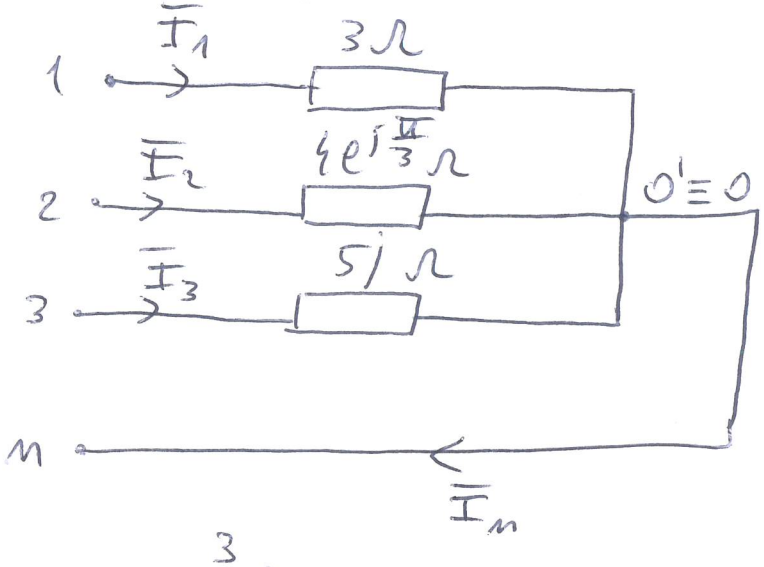
$$= 450\,(0.2 - j\,0.15)\ A$$

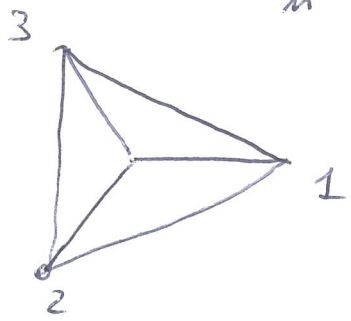
$$\bar{I}_2 = \bar{I}_b - \bar{I}_a = \frac{\bar{V}_{23}}{z_3} - \frac{\bar{V}_{12}}{z_1} = 450(-1.14 + j\,0.38)\ A$$

$$\bar{I}_3 = \bar{I}_c - \bar{I}_b = \frac{\bar{V}_{31}}{z_2} - \frac{\bar{V}_{23}}{z_3} = 450(0.94 - 0.23j)\ A$$

TRIFASE 1

3)





$V_c = 240\,V$

$E_f = \frac{240}{\sqrt{3}} = 139\,V$

$$\bar{I}_1 = \frac{\bar{E}_1}{\bar{z}_1} = 46\,A$$

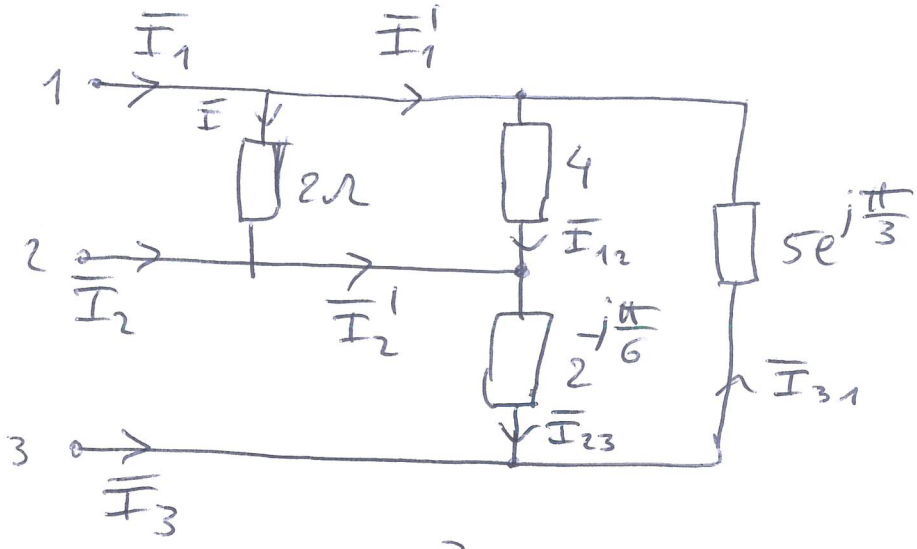
$$\bar{I}_2 = \frac{\bar{E}_2}{\bar{z}_2} = \frac{139e^{-j\frac{2}{3}\pi}}{4e^{j\frac{\pi}{3}}} = 35e^{-j\pi} = -35\,A$$

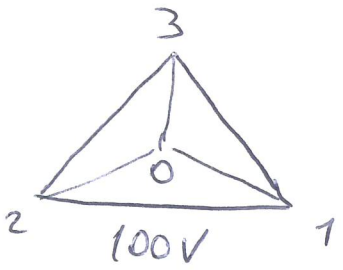
$$\bar{I}_3 = \frac{\bar{E}_3}{\bar{z}_3} = \frac{139e^{j\frac{2}{3}\pi}}{5j} = 28e^{j\frac{\pi}{6}}\,A$$

$$\bar{I}_n = \bar{I}_1 + \bar{I}_2 + \bar{I}_3 = 35 + 14j\,A$$

TRIFAZE 1

6)





$$\bar{I}_1' = \bar{I}_{12} - \bar{I}_{31} = \frac{100}{4} - \frac{100e^{j\frac{2}{3}\pi}}{5e^{j\pi/3}} =$$

$$= 25 - 20e^{j\frac{\pi}{3}} =$$

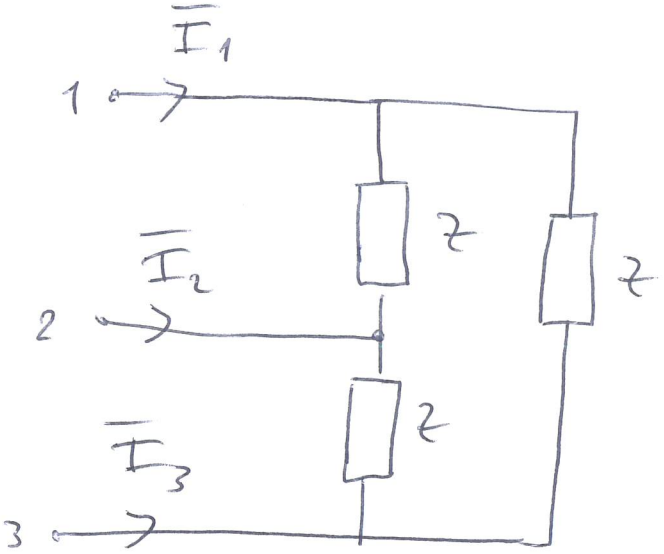
$$= 15 - j17.32 \text{ A}$$

$$\bar{I}_1 = \bar{I}_1' + \bar{I} = \frac{100}{2} + 15 - j17.32 =$$

$$= 65 - j17.32 \text{ A}$$

TRIFASE 1

7)



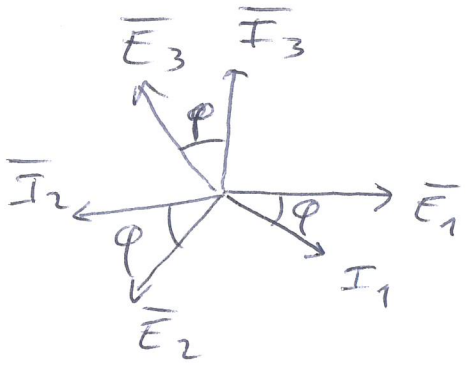
$Z = 3 + 4j\ \Omega$

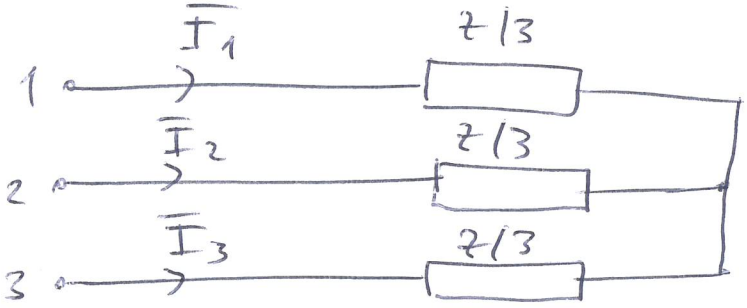
$220\ V\ \ 3\phi$

$|Z| = 5\ \Omega$

$\varphi = 0.927\ rad$

$E_f = \frac{220}{\sqrt{3}} = 127\ V$





$\left|\frac{Z}{3}\right| = \frac{5}{3}\ \Omega$

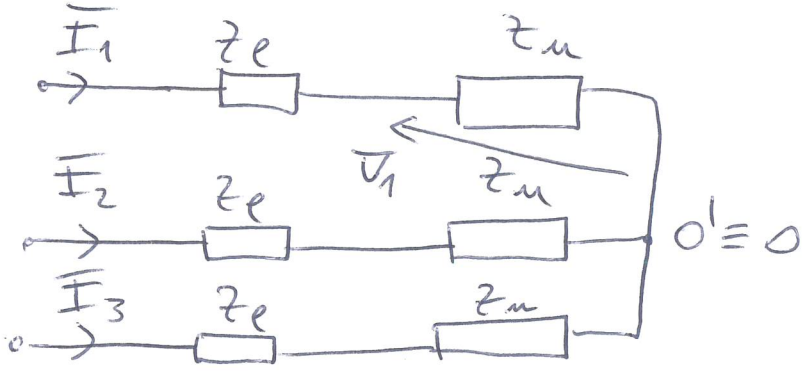
$I_e = \frac{E_f}{|Z/3|} = \frac{220}{\sqrt{3} \cdot 5/3} = 44\sqrt{3} = 76.21\ A$

$P = \sqrt{3}\ V_e\ I_e \cos\varphi = 17.4\ kW$

$Q = \sqrt{3}\ V_e\ I_e \sin\varphi = 23.2\ kVAR$

TRIFASE 1

8)



$z_u = 3 + 4j\ \Omega$ $\quad |z_u| = 5\ \Omega$

$z_e = 0.1 + 0.2j\ \Omega$ $\quad \varphi_u = 0.927$ rad

220 V 3ϕ

$$z_T = 3.1 + 4.2j\ \Omega = 5.22\, e^{j\,0.935}\ \Omega$$

$$I_e = \frac{220}{\sqrt{3}} \frac{1}{|z_T|} = 24.33\ A$$

$$|\bar{V}_1| = \frac{|z|}{|z + z_e|} |\bar{E}_1| = \frac{5}{5.22} 127 = 121.6\ V$$

$$P_u = 3 \times 121.6 \times 24.33 \times \cos 0.927 = 5327\ W$$

$$\varphi_u = 3 \times 121.6 \times 24.33 \times \sin 0.927 = 7099\ VAR$$

$$P_e = 3 R_e I_e^2 = 3 \times 0.1 \times 24.33^2 = 178\ W$$

$$P_T = 3 \times 127 \times 24.33 \times \cos 0.935 = 5505\ W$$

$$Q_T = 3 \times 127 \times 24.33 \times \sin 0.935 = 7458\ VAR$$