14. Zadatci snaga

1. ZI 18./19. - 5.

Prividna snaga simetričnog induktivnog trošila spojenog u trokut je 4,5 kVA, a radna snaga trošila je 3,6 kW uz linijsku struju od 30A. Odredite impedanciju.

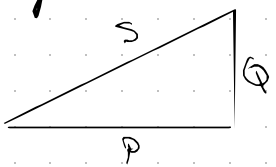
$S_{uk} = 4{,}5\,kVA$

$P = 3{,}6\,kW$

$I_l = 30A$

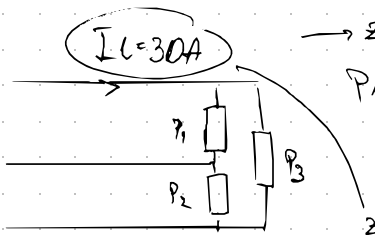
$Z = ?$

TROKUT



$\rightarrow Q = \sqrt{S^2 - P^2}$

$Q = 2{,}7\,kVAr \rightarrow Q_{uk}$



$\rightarrow$ zbog simetričnosti trošila

$P_1 = P_2 = P_3 \rightarrow P_1 = \frac{P_{uk}}{3} = 1200W$

$Q = \frac{Q_{uk}}{3} = 900VAr$

za njih znamo da kada je simetrično trošilo, fazna struja je manja $\sqrt{3}$ puta

$I_{13} = \frac{I_l}{\sqrt{3}}$

$I_{13} = 10\sqrt{3}$

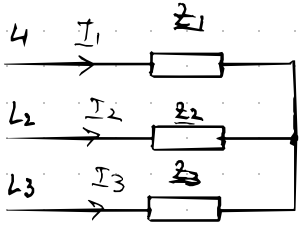
$\Rightarrow P_1 = I^2 \cdot Re\{Z\} \rightarrow Re\{Z\} = 4$

$Q_1 = I^2 \cdot Im\{Z\} \rightarrow Im\{Z\} = 3$

$\boxed{Z = 4 + 3j}$

Zadatak 2.) JES – 20/21 – 8.)

- simetrični trofazni generator
- $U_l = 200\sqrt{3}\ V$
- simetrično trošilo – ZVIJEZDA
  $Z_1 = Z_2 = Z_3 = 20 + j20\ \Omega$



→ zbog simetričnosti $U_{o'o} = 0V$

$P_{uk} = ?$

↳ trebamo I_1, I_2 i I_3 da možemo $P_1 + P_2 + P_3 = P_{uk}$

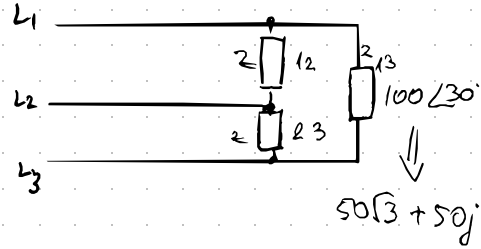
$P_{uk} = I^2 \cdot Re\{Z\} = P_1 + P_2 + P_3$ – ali zbog simetričnosti to je $P_{uk} = 3P$

$P_{uk} = 3 \cdot I_1^2 \cdot Re\{Z\}$

$$I_1 = \frac{U_f \angle 0^\circ}{Z_1} = \frac{200}{20+j20} = 5\sqrt{2}\angle -45^\circ \longrightarrow \boxed{P_{uk} = 3000\ W}$$

Zadatak 3.) DIP – 19./20. – 9.)

- simetrično fazno trošilo, TROKUT
- $Z_1 = Z_2 = Z_3 = 100\angle 30^\circ\ \Omega$
- simetričan trofazni izvor, $U_l = 380\ V$



$P_{uk} = ?$

$$U_f = \frac{U_l}{\sqrt{3}} = 220V$$

$$I_{12} = \frac{U_l}{Z} = 3{,}8\angle -30^\circ$$ → zbog simetričnosti $Z_1 = Z_2 = Z_3$ jednake su snage $P_1 + P_2 + P_3 \longrightarrow P_{uk} = 3P$

$P = 3 \cdot I^2 \cdot Re\{Z\}$

$$\boxed{P_{uk} = 3{,}75\ kW}$$

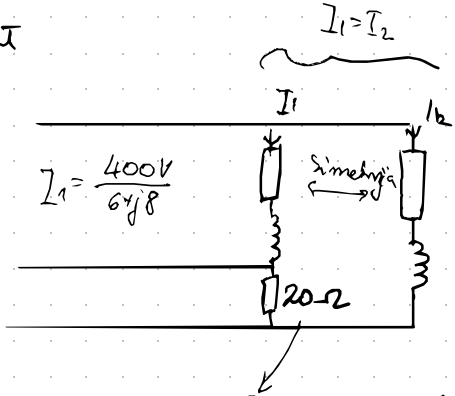
Zadatak 4) 1ES - (9./20. - 18)

- simetrični trofazni izvor → TROKUT

$Q_{uk} = ?$ $\quad U_c = 400V$

$Z_{21} = Z_{31} = 6 + j8\,\Omega$

$Z_{23} = 20\,\Omega$



$Q_{uk} = I^2 \cdot Im\{Z\}$

$Q_{uk} = 2 \cdot I_1^2 \cdot 8 = 25600\,kVAr$

inducirani jer zavojnica

nema Q jer nema $Im\{Z\}$