1. 60 kVA; 6,6/0,67 kV; Dd6; 50 Hz;

PH : $I_0 = 0{,}047\ A$, $P_0 = 254\ W$ } 25°C

KS : $U_k = 0{,}42\ kV$, $P_k = 1{,}02\ kW$ }

$R_{st1} = 13\ \Omega$ $R_{st2} = 90\ m\Omega$ → 25° C

T - za 75° C

$I_{1n} = \frac{S_n}{3 U_{nf}} = \frac{S_n}{\sqrt{3} U_{n1}} = 5{,}249\ A$ $I_{2n} = \frac{S_n}{\sqrt{3} U_{n2}} = 51{,}7\ A$

$u_k = \frac{U_k}{U_{n1}} = 6{,}36\%$ $I_{0\%} = \frac{I_0}{I_{n1}} = 0{,}895\%$ $Z_b = \frac{U_{1n}}{\sqrt{3} I_{1n}} = 725{,}95\ \Omega$

PH: $P_0 = 3 \frac{U_{nf1}^2}{R_0} \Rightarrow R_0 = \frac{U_{1n}^2}{P_0} = 171496\ \Omega = 2362\%$ ✓

$I_{0r} = \frac{U_{1n}}{\sqrt{3} R_0} = 0{,}0222\ A$ $I_\mu = \sqrt{I_0^2 - I_{0r}^2} = 0{,}0414\ A$

$X_\mu = \frac{U_{1nf}}{I_\mu} = 92041\ \Omega = 12679\%$ ✓

KS

$R_1 = \frac{R_{st1}}{2} = 6{,}5\ \Omega \quad R_2 = 4{,}5\ m\Omega \quad b = 1{,}1923$

$a = 9{,}85 \quad R_2' = R_2 \cdot a^2 = 4{,}366\ \Omega$

$P_k = 3 \cdot I_1^2 (R_1 + R_2') + P_{dod}$

$P_{dod} = 121{,}86\ W$

$P_{dod} = 3 I_1^2 R_{dod} \Rightarrow R_{dod} = 1{,}474\ \Omega$

preračun na toplo 75°C

$P_{Cu75} = b \cdot 3 I_1^2 (R_1 + R_2') = 1070{,}86\ W$

$P_{dod75} = 102{,}2\ W$

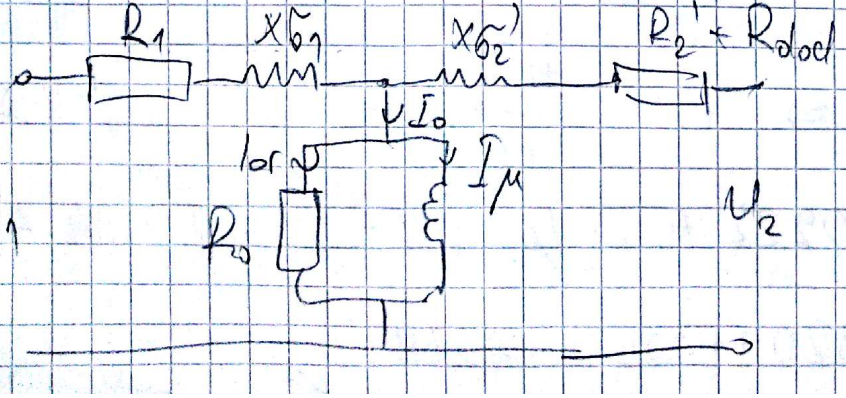
$R_{175} = 5 R_1 = 7{,}75\ \Omega \quad R_{2'75} = 5{,}206\ \Omega \quad R_{dod75} = \frac{R_{dod}}{6} = 1{,}236\Omega$

$R_1 = 0{,}895\ \% \quad R_2 = 0{,}6\ \% \quad R_{dod} = 0{,}203\ \%$

$u_r = R_1 + R_2' + R_{dod} = 1{,}698\ \%$

$X_\sigma = u_\sigma = \sqrt{u_k^2 - u_r^2} = 6{,}129\ \%$

$X_{\sigma 1} = X_{\sigma 2}' = \frac{X_\sigma}{2} = 3{,}06\ \%$

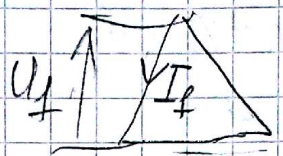


2. DzO 1MVA 670/440V $u_k = 7{,}5\%$ $\eta_n = 98{,}123\%$ 50Hz

u YaO najveći mogući omjer

$U_{1f} = 670\,V$

$I_{1f} = 497{,}51\,A$

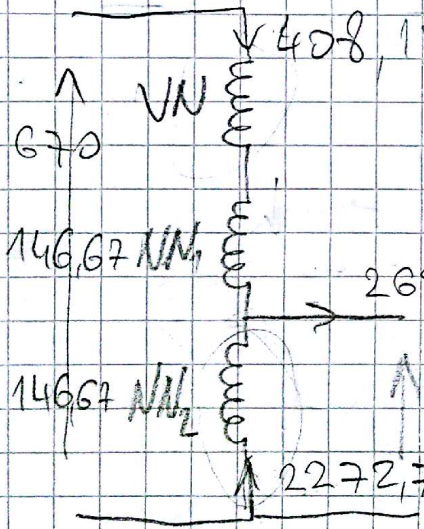


$U_{2pf} = \frac{U_e}{3} = 146{,}67\,V$

$I_{2f} = 1312{,}16\,A$

$\frac{U_{1f}}{U_{2pf}} = \frac{I_{2f}}{I_{1f}}$

$I_{2f} = 2272{,}7\,A$



$U_{1fa} = 670 + 2 \cdot 146{,}67 = 963{,}34\,V$

$U_{2fa} = 146{,}67\,V$

$S_a = S_n \frac{U_{1a}}{U_{1a} - U_{2a}} = 1{,}1796\,MVA$

$S_1 = 3 \cdot U_{1fa} \cdot I_{1fa}$

$S_1 = 3 \cdot U_{2fa} \cdot I_{2fa}$

$I_{2pf} = \sqrt{3}\, I_{2f} = 2272{,}7\,A$

3. 100/20 kV, 32 MVA, 50 Hz, $u_k = 12,5\%$, $\frac{P_k}{P_0} = 3$, Yd1

$\vartheta_m = 120°C$, $\vartheta_{0k} = 40°C$.

$\alpha = ?$ $t = 2\tau$ iz hladnog na max. temperaturu

ako je temperatura okoline 10°C

$\vartheta_m = 80\ K$

$\vartheta_{m2} = \underline{110\ K}$

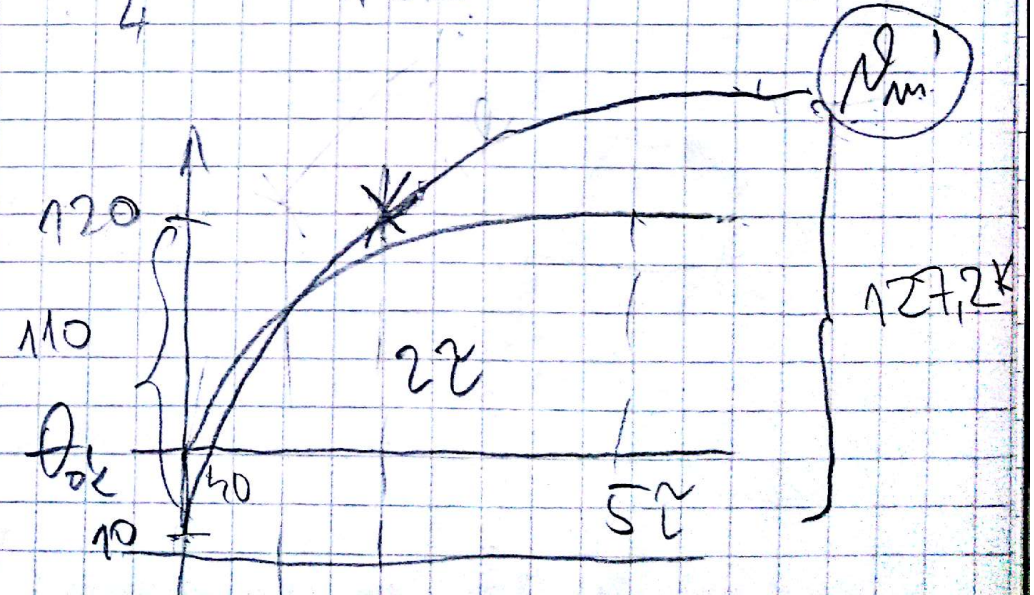
$\vartheta_2 = \vartheta_{m2} = \vartheta_0 + (\vartheta_m' - \vartheta_0)(1 - e^{-\frac{2\tau}{\tau}})$

$\vartheta_m' = \frac{\vartheta_{m2}}{1 - e^{-2}} = 127,2\ K$

$\frac{\vartheta_m'}{\vartheta_m} = \frac{P_0 + \alpha^2 P_k}{P_0 + P_k} = \frac{1 + \alpha^2 \frac{P_k}{P_0}}{1 + \frac{P_k}{P_0}} = \frac{1 + 3\alpha^2}{4} = 1,59$

$1 + 3\alpha^2 = 6,36$

$\alpha = 1,3367$



5. $N = 36$ $N = 12$

$2p = 6$ $p = 2$

- dwuwarstwowe

10 zwojnic w sekcji

$y = 5$

$q = 2$

$q = \frac{N}{2pm} = 2$

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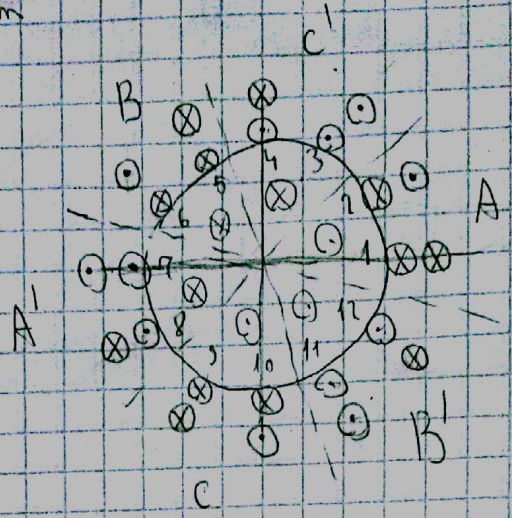
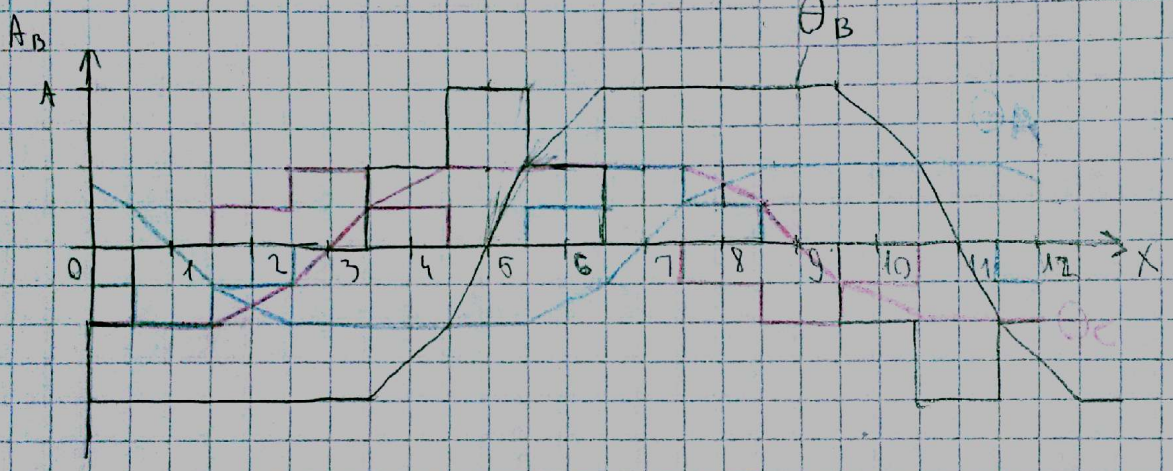
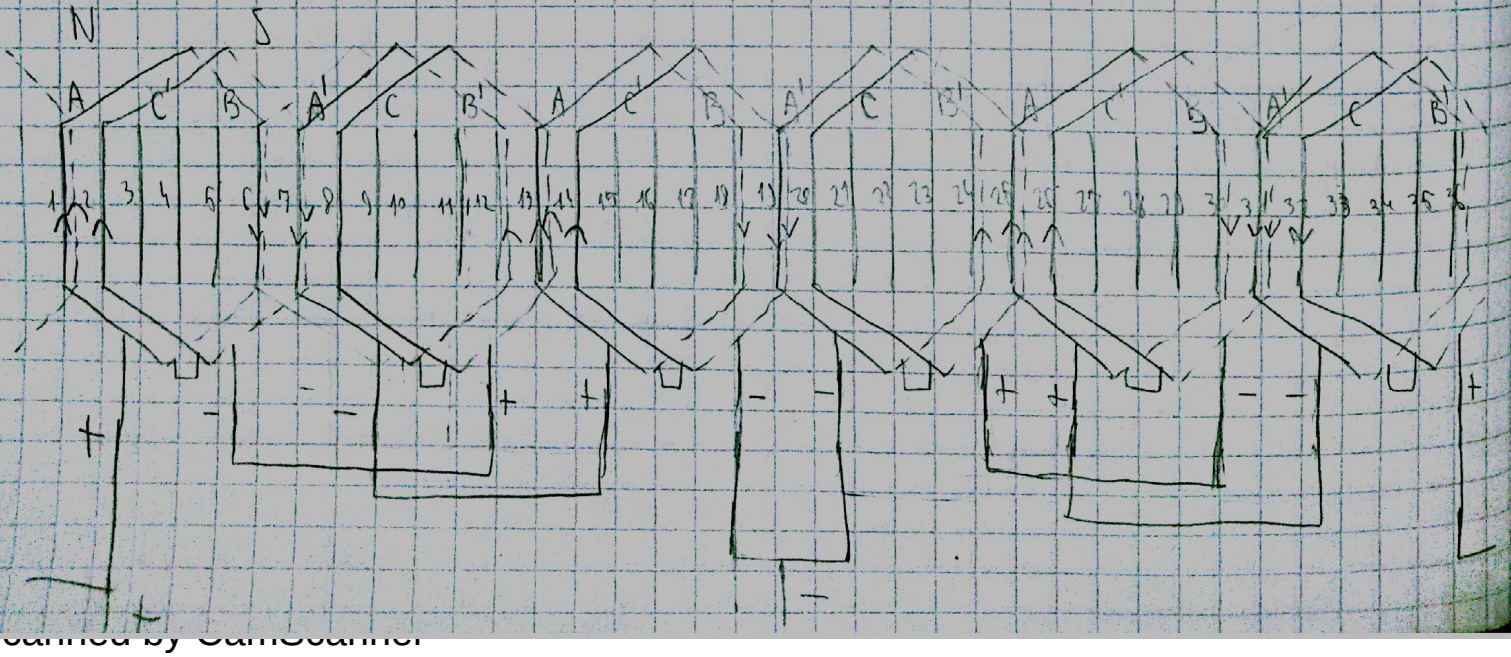
a) $I_B = max$

$I_A = I_C = -\frac{I_B}{2}$





b) +A = 1 B = 5 C = 9



d) $a = 1, 2, 3, 6$

$\frac{2\pi}{6}$ → cykliczny

θ_{wk}

$(1,75)\theta_b$