12-8

$$I_N = \frac{P_N}{\sqrt{3}\,U_N \cos\varphi_N \eta_N} = \frac{125000}{\sqrt{3}\times 6000\times 0.84\times 0.95}\ A = 154.80\ A$$

13-13

由于 根据 $T_e = T_2 + T_0 = T_L + T_0$、负载转矩 T_L 不变，则电磁转矩 T_e 不变

磁通 Φ_m 下降 5%，由 $T_e = C_T \Phi_m I_2' \cos\varphi_2$ 得 $I_2'\cos\varphi_2$ 上升。

转速 n 下降，功率因数 $\cos\varphi_1$ 变大

13-18

定子每相视角的阻抗为

$$Z_0 = \frac{U_0}{\sqrt{3}I_0} = \frac{380}{\sqrt{3}\times 10}\Omega = 21.94\Omega \quad R_0 = \frac{P_0 - P_m}{3I_0^2} = \frac{600-100}{3\times 10^2}\Omega = 1.67\Omega$$

$$X_0 = \sqrt{Z_0^2 - R_0^2} = \sqrt{(21.94)^2 - (1.67)^2}\,\Omega = 21.88\Omega$$

则励磁阻抗为

$$R_m = R_0 - R_1 = (1.67 - 0.6)\Omega = 1.07\Omega \quad X_m = X_0 - X_1 = (21.88 - 2.59)\Omega = 19.29\Omega$$

短路阻抗为

$$Z_k = \frac{U_k}{\sqrt{3}I_k} = \frac{100}{\sqrt{3}\times 19}\Omega = 3.04\Omega \quad R_k = \frac{P_k}{3I_k^2} = \frac{1000}{3\times 19^2}\Omega = 0.92\Omega$$

$$X_k = \sqrt{Z_k^2 - R_k^2} = \sqrt{(3.04)^2 - (0.92)^2}\,\Omega = 2.90\Omega$$

则 $R_2' = R_k - R_1 = (0.92 - 0.6)\Omega = 0.32\Omega$，$X_1 \approx X_2' = \frac{1}{2}X_k' = 1.45\Omega$

13-21

(1) 电磁功率 $P_e = P_N + P_{Cu2} + P_{n2} + P_\Delta = (17 + 0.5 + 0.15 + 0.2)\ kW = 17.85\ kW$

转差率 $s = \frac{P_{Cu2}}{P_e} = \frac{0.5}{17.85} = 0.028$

额定转速 $n_N = (1-s)\frac{60f}{p} = (1-0.028)\times\frac{60\times 50}{2}\ r/min = 1458\ r/min$

负载转矩 $T_2 = \frac{P_N}{\Omega_N} = \frac{60P_N}{2\pi n_N} = \frac{60\times 17000}{2\pi\times 1458}\ N\cdot m = 111.3\ N\cdot m$

电磁转矩 $T_e = \frac{P_e}{\Omega_s} = \frac{60P_e}{2\pi n_s} = \frac{60\times 17850}{2\pi\times 1500}\ N\cdot m = 113.6\ N\cdot m$

(2) 空载转矩 $T_0 = T_e - T_2 = (113.6 - 111.3)\ N\cdot m = 2.3\ N\cdot m$

二、选择题

1. A　3. D　5. D　6. B　8. A　9. A

五、计算题

2. $s=\frac{n_s-n_N}{n_s}=\frac{1500-1442}{1500}=0.0387$　$C=1+\frac{X_m}{X_{1\sigma}}=2$

$$T_e=\frac{1}{\sqrt{2}s}\cdot\frac{3U_1^2\cdot\frac{R_2'}{s}}{(R_1+C\frac{R_2'}{s})^2+(X_{1\sigma}+CX_{2\sigma}')^2}=\frac{60}{2\pi\times1500}\cdot\frac{3\times380^2\times\frac{3.18}{0.0387}}{(4.9+2\times\frac{3.18}{0.0387})^2+(6.7+2\times9.85)^2}=7.76\ N\cdot m$$

$$T_{max}=\frac{1}{\sqrt{2}s}\cdot\frac{3U_1^2}{2\omega[R_1+\sqrt{R_1^2+(X_{1\sigma}+X_{2\sigma}')^2}]}=\frac{60}{2\pi\times1500}\cdot\frac{3\times380^2}{2\pi[4.9+\sqrt{4.9^2+(6.7+9.85)^2}]}=22.06\ N\cdot m$$

$$I_{st}=\frac{U_1}{\sqrt{(R_1+CR_2')^2+(X_{1\sigma}+CX_{2\sigma}')^2}}=\frac{380}{\sqrt{(4.9+2\times3.18)^2+(6.7+2\times9.85)^2}}=13.37\ A$$

校电流 $I_{stL}=\sqrt{3}I_{st}=\sqrt{3}\times13.37\sqrt{A}=23.06\ A$

$$T_{st}=\frac{1}{\sqrt{2}s}\cdot\frac{3U_1^2\cdot R_2'}{(R_1+CR_2')^2+(X_{1\sigma}+CX_{2\sigma}')^2}=\frac{60}{2\pi\times1500}\cdot\frac{3\times380^2\times3.18}{(4.9+2\times3.18)^2+(6.7+2\times9.85)^2}=10.77\ N\cdot m$$