Corrigé BTN STI GC SESSION 1995

EXERCICE DE CHIMIE

1°) $PV = nRT \Rightarrow T = \frac{PV}{nR} = \frac{10^5 \times 2,4\,10^{-3}}{0,1 \times 8,31} = 288,8\ K = 288,8 - 273,15 = 15,6°C$

$\theta = 15,6°C$

2°) $HCl + H_2O \longrightarrow H_3O^+ + Cl^-$

$[H_3O^+] = \frac{0,1}{2} = 0,05\ mol.L^{-1}$ $\quad pH = -\log_{10}[H_3O^+] = 1,3$

EXERCICE D'ELECTRICITE

1°) $E_1 I_1 = M_1 \Omega_1 \Rightarrow E_1 = \frac{M_1 \Omega_1}{I_1} = \frac{60 \times 1200 \times \frac{2\pi}{60}}{26} = 290\ V$

$U_1 = E_1 + RI_1 = 290 + 1 \times 26$

$U_1 = 316\ V$

2°) $\left.\begin{array}{l} M_1 = 60\ N.m \longrightarrow I_1 = 26\ A \\ M_2 = 100\ N.m \longrightarrow I_2 = ? \end{array}\right\} \Rightarrow I_2 = \frac{100}{60} \times 26 = 43,3\ A$

$E_2 = U_2 - RI_2 = 316 - 1 \times 43,3 = 272,7\ V$

$\left.\begin{array}{l} E_1 = 290\ V \longrightarrow n_1 = 1200\ tr/min \\ E_2 = 272,7\ V \longrightarrow n_2 = ? \end{array}\right\} \Rightarrow n_2 = \frac{272,7}{290} \times 1200 = 1128,4\ tr/min$

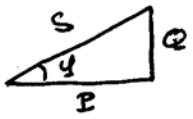
PROBLEME D'ELECTRICITE

1°) Etude de l'installation

1.1. $P = P_1 + P_2 = 4000 + 3000 = 7000\ W$

$Q = Q_1 + Q_2 = 0 + 3000 \times \tan\varphi_2 = 3000 \times 0,882 = 2646\ var$

$S = \sqrt{P^2 + Q^2} = \sqrt{7000^2 + 2646^2} = 7483,3\ VA$



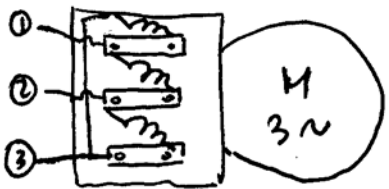
1.2. $S = \sqrt{3}UI \Rightarrow I = \frac{S}{\sqrt{3}U} = \frac{7483,3}{1,732 \times 380} = 11,4\ A$

1.3. $\cos\varphi = \frac{P}{S} = \frac{7000}{7483,3} = 0,935$

1.4. Non car $\cos\varphi > 0,93$

2°) Etude du moteur asynchrone

2.1. Le moteur est un 380V/660V, il faut donc 380V aux bornes d'un enroulement sur un réseau 220V/380V, il faut brancher un enroulement entre deux phases $\Rightarrow$ couplage triangle



2.2. $n_s = \frac{f}{p} = \frac{50}{3} = 16,67\ tr/s$

$n = n_s(1 - g) = 16,67(1 - 0,08) = 15,33\ tr/s$

$n = 15,33 \times 60 = 920\ tr/min$

3°) Etude électrique du chauffe eau

3.1. Couplage triangle car chaque résistance est entre deux phases.

3.2. $P = \sqrt{3}UI \Rightarrow I = \frac{P}{\sqrt{3}U} = \frac{4000}{1,732 \times 380} = 6,08\ A$ $\quad J = \frac{I}{\sqrt{3}} = 3,5\ A$ $\quad R = \frac{U}{J} = \frac{380}{3,5} = 109\ \Omega$

4°) Etude calorimétrique du chauffe eau.

4.1. $F = \rho g h s = 1000 \times 9,8 \times 0,7 \times 2.10^{-4} = 1,372\ N$

4.2. $Q = mc(\theta_f - \theta_i) = \rho V c(\theta_f - \theta_i) = 1000 \times 0,21 \times 4185\,(80 - 10) = 6,152\ 10^7\ J$