CORRECTION SUJET PREMIER TOUR ELECTRICITE TERMINALES T1

EXERCICE 1 :

1. Etude à vide :

1.1 Rapport de transformation : m= U_2 / U_1= 24 / 230 = 0.1

1.2 nombre de spire au secondaire : m= N_2 / N_1 ⇔ N2= 0.1 *520 = 52 spires

2. Etude en court circuit:

2.1 Valeur de Icc : m = I_{1cc} / I_{2cc} ⇔ I_{2cc} = I_{1cc}/m = 0.3/0.1= 3A

2.2 Calcule de Escc : Rs; Xs et Ls

Escc = mU_{1cc}=0.1*230.85 = 1.98 V

P_{1cc} = RsI_{2cc}^2 ⇔ Rs = P_{1cc}/I_{2cc}^2 = 5/3^2 = 0.55 Ω

Escc= ZsI_{2cc} ⇔ Zs =Escc/I_{2cc} = 1.98/3= 0.66Ω

X_s^2 = Z_s^2 - R_s^2 = 0.66^2-0.55^2 = 0.36 Ω

Xs = Ls 2πf ⇔ Ls = Xs/2πf = 0.36/(2*3.14*50) = 1.14 mH

3. Etude en charge:

3.1 Calcule de U_2:

ΔU_2 = U_{2V} – U_2 ⇔ U_2 = U_{2V} - ΔU_2

ΔU_2 = RsI_2cosφ2 +jXsI_2sinφ2 = (0.65*2.5*0.8) +(0.45*2.5*0.6) = 1.975V

U_{2V} = mU_1 = 0.1*230 = 23V

U_2 = U_{2V} - ΔU_2 = 23 – 1.975 = 21.025 V

3.2 Calcule du rendement:

η= P_2/P_1=P_2/(P_2+P_{pertes}+P_{1cc})

P_2 = U_2I_2cosφ2= 21.025*2.5*0.8= 42.5 W

Calculons R_1 ; R_2 puis P_{1cc}

R_1= U_{1c}/I_{1c}= 5/0.19=26.31Ω

R_2= U_{2c}/I_{2c}= 1.25/2.5= 0.5Ω

P_{1ccc}= (R_1+R_2)I_{1cc}^2= (26.31+0.5)0.3^2=2.4W

η=P_2/(P_2+P_{FV}+P_{1cc})= 42.5/(42.5+4.5+2.4)=0.86

EXERCICE2:

1. La puissance utile Pu :

P_u = T_uΩ

Ω= 2πn2/60 = 2*3.14*585/60= 61.23 ⇔ Pu= 653*61.23=39983.19 W

2.le rendement:

η=Pu/Pa=Pu/(Pu+Σperte=39983.19/(39983.19+5000)=0.88

3. le glissement g :

η=1-g ⇔ g=1-η = 1-0.88 = 0.12

4. le courant en ligne :

P_a= P_u + perte=39983.19+5000= 44983.19W

P_a = $\sqrt{3}$$U_1$ I_1 cosφ1 =

I_1 = 44983.19/(380*0.82*√3)= 83.34A

5. La fréquence des courants rotoriques :

g = (fs – fr)/fs ⇔

fr = fs- gfs=50-5= 45 Hz