P1 - Elt-340 - Werikson Alves - 96708 - 5/4/21

①

3 pernas

$\ell = 10\,cm$

$N_E = 100\,e$

$N_D = 200\,e$

$\mu_R = 9678$

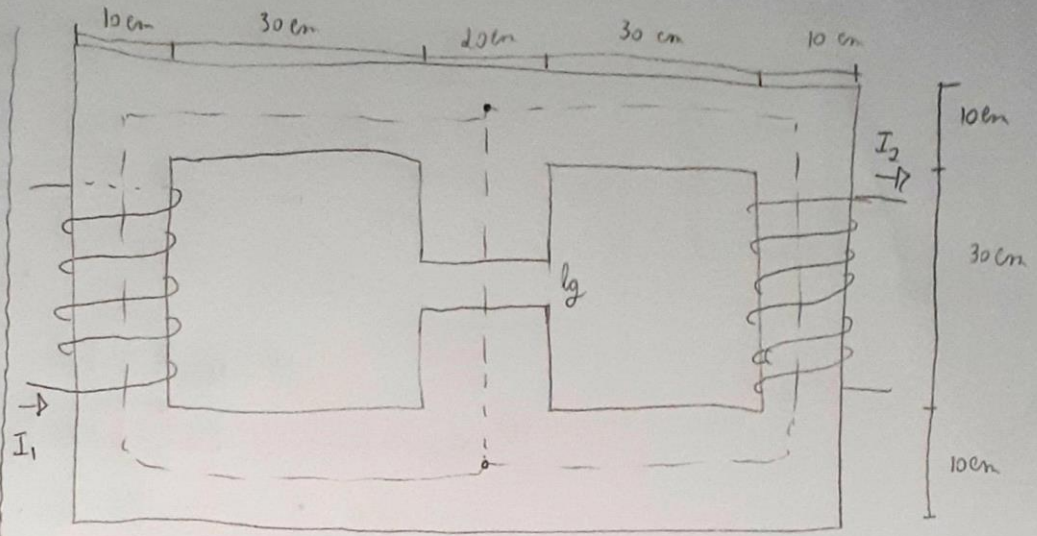
$A_g = 1.04\,A_c$

$B_g = ?$

$I_1 = 1\,A$

$I_2 = 1\,A$

$l_g = 1\,mm$




$$R_g = \frac{l_g}{\mu_0 A_g} = \frac{1\times10^{-3}}{\mu_0 \times 1.04\times200\times10^{-4}} = 38{,}26\ K\frac{Ae}{Wb}$$

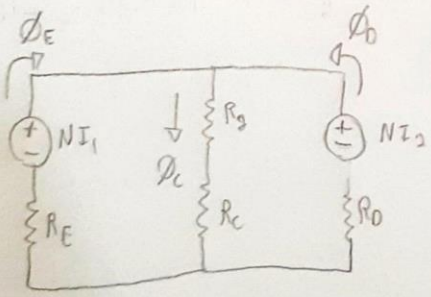
$$R_E = \frac{l_E}{\mu_R \mu_0 A} = \frac{130\times10^{-2}}{9678\,\mu_0\,100\times10^{-4}} = 10{,}69\ K\frac{Ae}{Wb}$$

$$R_D = \frac{l_D}{\mu_R \mu_0 A} = \frac{130\times10^{-2}}{9678\times\mu_0\times100\times10^{-4}} = 10{,}69\ K\frac{Ae}{Wb}$$

$$R_C = \frac{l_C}{\mu_R \mu_0 A} = \frac{40\times10^{-2}}{9678\times\mu_0\times200\times10^{-4}} = 1{,}64\ K\frac{Ae}{Wb}$$

$$\phi_C = \phi_D + \phi_E$$

$\phi_C = 3.31\ mWb$




$$N_1 I_1 - R_E\phi_E = N_2 I_2 - R_D\phi_D$$

$$100 - 10{,}69K\,\phi_E = 200 - 10{,}69K\,\phi_D$$

$$\phi_E = \phi_D - \frac{100}{10{,}69K} \Rightarrow \boxed{\phi_E = -3{,}02\ mWb}$$

$$N_2 I_2 - R_D\phi_D = (R_g + R_C)\phi_C$$

$$200 - 10{,}69K\,\phi_D = 39{,}90K(\phi_D + \phi_E)$$

$$200 - 10{,}69K\,\phi_D = 39{,}9K\,\phi_D + 39{,}9K\,\phi_D - 373{,}27$$

$$\phi_D = \frac{573{,}27}{90{,}5K} = 6{,}33\ mWb$$

$$B_g = \frac{\phi_C}{A_g} = \frac{3.31\,m}{1{,}04\times200\times10^{-4}} = 0{,}16\ \frac{Wb}{m^2}$$

$B_g = 0{,}16\ T$

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②

$N = 708\ e$

$R = 4\ \Omega$

$d = 1\ mm$

$I = ?$

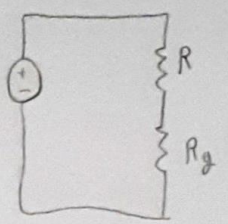
$V = ?$

$B_g = 0.1\ T$

$B_g = 0.1\ T \rightarrow H = 100\ \frac{A}{m}$

$H_g = \frac{0.1}{\mu_0} = 79,58\ K\ \frac{A}{m}$

$l_m = 60\ cm$




$NI = H_g l_g + H l_m$

$708\ I = (79,58K \times 1 \times 10^{-3}) + (100 \times 60 \times 10^{-2})$

$I = \frac{139,58}{708} \Rightarrow I = 197,14\ mA$

$I = 0,20\ A$

$V = R\ I$

$V = 4 \times 0,197$

$V = 788,57\ mV$

$V = 0,79\ V$

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③

2 Polos (p)
8 Bobinas (b)
5 e/b
$\frac{\Phi}{p} = 0,06$ Wb

a) $V_B = 12V$
$\omega = ?$
a vazio

$$K = \frac{Z P}{60 a} = \frac{(2 \times 6 \times 5) \times 2}{60 \times 2} = 1$$

$$\omega = \frac{E_A}{K \Phi} = \frac{12}{1 \times 0,06} = 200 \text{ rpm}$$

Imbricado

b) $P_B = 708$ W

Ignorando a resistência interna:

$$I_A = \frac{P_B}{E_A} = \frac{708}{12} = 59 A$$

$$K = \frac{Z P}{2\pi a} = \frac{(2 \times 6 \times 5) 2}{2\pi \times 2} = \frac{60}{2\pi}$$

$$\tau_{ins} = K \Phi I_A = \frac{60}{2\pi} \times 0,06 \times 59 = 33,80 \text{ N.m}$$