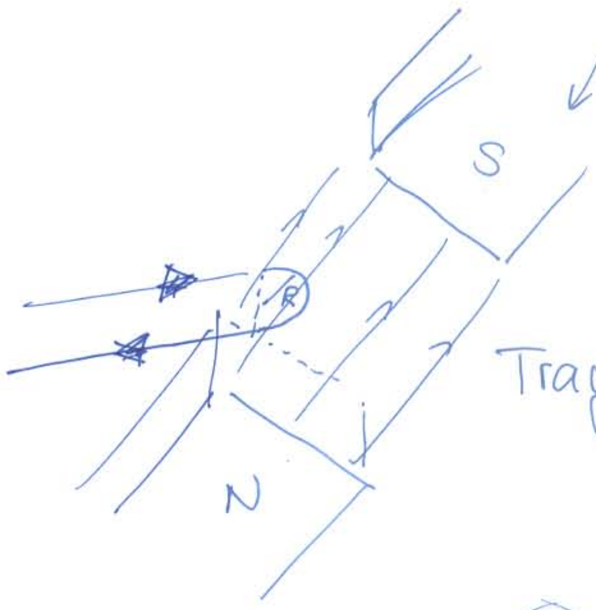
FIS1532 Pauta I3

Problema 1:

1.)



1pt

1pt

Trayectoria = mitad de un circulo

2.) $T = \frac{(2\pi R)/2}{v} = \frac{\pi R}{v}$ 0.5pt

$R = ?$ $\frac{mv^2}{R} = F_L$ 1pt

centrifugal

$\vec{F}_L = q\,\vec{v} \times \vec{B} = qvB\,\underbrace{\cos(45°)}_{=\frac{1}{\sqrt{2}}} = \frac{qvB}{\sqrt{2}}$ 1pt

$\frac{mv^{\cancel{2}}}{R} = \frac{q\cancel{v}B}{\sqrt{2}} \Rightarrow \boxed{R = \frac{\sqrt{2}\,mv}{qB}}$ 1pt

$$\Rightarrow T = \frac{\pi}{\cancel{v}} \frac{\sqrt{2}\, m \cancel{v}}{qB} = \frac{\sqrt{2}\,\pi\, m}{qB} \leftarrow 0.5pt$$

<u>Valor numérico:</u>

$$T \cong \frac{1{,}4 \cdot 3{,}14 \cdot 9{,}11 \times 10^{-31}\ kg}{1{,}6 \times 10^{-19} C \cdot 0{,}01\ T}$$

$$= \underbrace{\frac{1{,}4 \cdot 3{,}1 \cdot 9{,}1}{1.6}} \times 10^{-31+19+2}\ s$$

$$\approx 1{,}4 \cdot 9 \cdot 2 = \frac{2{,}8 \cdot 9}{25{,}2} \approx 25$$

$$T \approx 2{,}5 \times 10^{-31+19+3}\ s = 2{,}5 \times 10^{-9}\ s$$

$$= \underline{2{,}5\ ns}$$

1pt con unidad

Problema 2 :

1) Ley de Ampère:

$$\oint_{C} d\vec{l}\cdot\vec{B} = \mu_0 \underbrace{I_{\text{encerrado}}}_{\substack{N_1 \times I \\ -N_2 \times I}} = \mu_0 (N_1 - N_2) I$$

(1pt)

campo uniforme etc:

$$l\cdot B = \mu_0 (N_1 - N_2) I$$

(1pt)

$$B = \frac{\mu_0 (N_1 - N_2)}{l} I$$

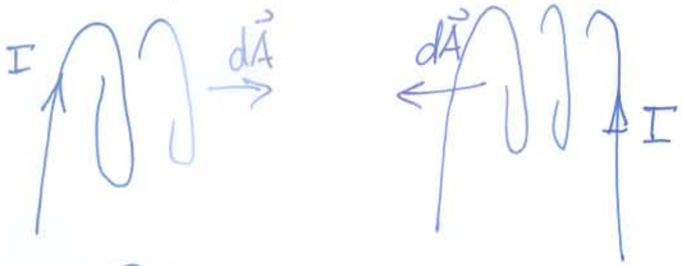
(1pt)

2) Faraday:

$$U_{ind} = -\frac{d}{dt}\int_{\text{bobinas}} d\vec{A}\cdot\vec{B}$$

(1pt)

$$= -\frac{d}{dt}\left\{ \int_{\text{bob.1}} d\vec{A}\cdot\vec{B} + \int_{\text{bob.2}} d\vec{A}\cdot\vec{B} \right\}$$



$$\Rightarrow \mathcal{U}_{ind} = -\frac{d}{dt}\left\{ N_1 A_1 B - N_2 A_2 B \right\} \leftarrow \text{1pt}$$

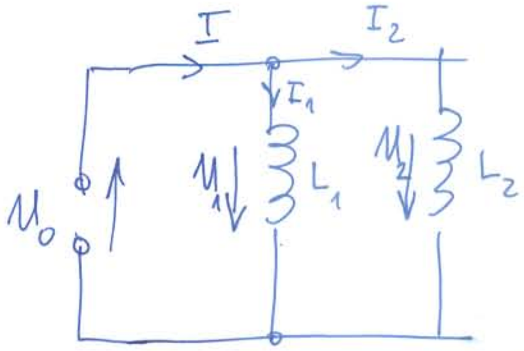
$A_1 \approx A_2$ superficie de una vuelta $= A = \pi\left(\frac{d}{2}\right)^2$

$$= -\frac{d}{dt}\left\{ A(N_1 - N_2) B \right\}$$

$$= -\underbrace{A(N_1-N_2)\frac{\mu_0 (N_1 - N_2)}{l}}_{=L}\frac{dI}{dt}$$

$$L = \frac{\mu_0 (N_1 - N_2)^2 A}{l} \leftarrow \text{1pt}$$

Problema 3:



K1: $I = I_1 + I_2$ ← 1pt

K2: $u_0 + u_1 = 0$

$$u_0 - L_1 \frac{dI_1}{dt} = 0 \qquad (1)$$

1pt

$$u_0 + u_2 = 0$$

1pt → $$u_0 - L_2 \frac{dI_2}{dt} = 0 \qquad (2)$$

$$\frac{dI_2}{dt} = \frac{dI}{dt} - \frac{dI_1}{dt}$$ ← 1pt

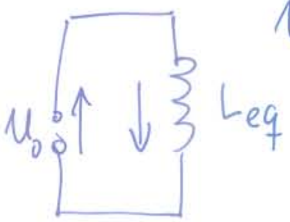
$$u_0 - L_1 \dot{I}_1 = 0 \qquad (1) \qquad | : L_1$$

$$u_0 - L_2 (\dot{I} - \dot{I}_1) = 0 \qquad (2) \qquad | : L_2$$

$$\left.\begin{aligned} \frac{u_0}{L_1} - \dot{I}_1 &= 0 \\ \frac{u_0}{L_2} + \dot{I}_1 - \dot{I} &= 0 \end{aligned}\right] +$$

$$u_0 \left(\frac{1}{L_1} + \frac{1}{L_2} \right) - \dot{I} = 0$$ ← 1pt

$$\Longrightarrow \frac{1}{L_{eq}} = \frac{1}{L_1} + \frac{1}{L_2}$$ ← 1pt



$$u_0 - L_{eq} \frac{dI}{dt} = 0$$