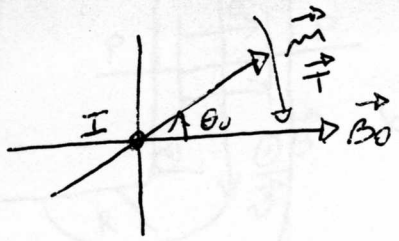
CAPÍTULO 7.

(1)



$\vec{T} = \vec{m} \times \vec{B_0}$

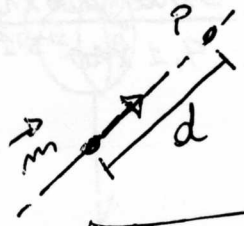
$T = m B \operatorname{sen}\theta$ p/ θ_0 pequeno → $\operatorname{sen}\theta_0 \approx \theta_0$

$T = m B \theta_0$

$\boxed{T = K \cdot \theta_0}$ Lei de Hooke

$\omega = \sqrt{\frac{K}{m}} \Rightarrow \omega = \sqrt{\frac{K}{I}} \Rightarrow \boxed{\omega = \sqrt{\frac{m B}{I}}}$

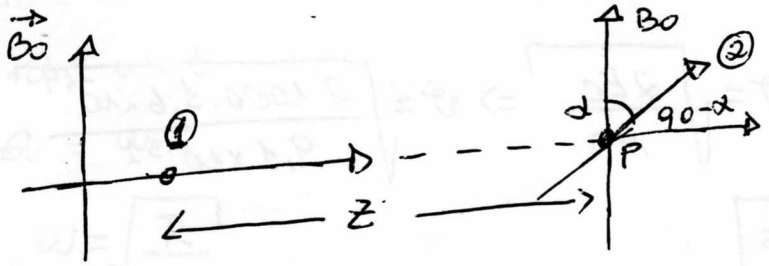
(2)



$\vec{E}(z) = \frac{\vec{P}}{2\pi \varepsilon_0 d^3}$ $\quad p \to \vec{m}$ $\quad \varepsilon_0 \to \frac{1}{\mu_0}$

a) $\boxed{\vec{B}(z) = \frac{\mu_0 \vec{m}}{2\pi z^3}}$

b)



$\vec{B}_{1(z)} = \frac{\mu_0 \vec{m}}{2\pi z^3}$

$\sum \vec{T} = \vec{0}$

$\vec{T}_1 + \vec{T}_{B0} = 0 \Rightarrow \vec{T}_1 = T_{B0}$

$\vec{T}_1 = \vec{m} \times \vec{B}_{1(z)} \Rightarrow T_1 = m B_{1(z)} \operatorname{sen}(90-\alpha)$

$\vec{T}_{B0} = \vec{m} \times \vec{B}_0 \Rightarrow T_{B0} = m B_0 \operatorname{sen}\alpha$

$\not{n} B_1(z) \operatorname{sen}(90-\alpha) = \not{n} B_0 \operatorname{sen}\alpha$

$$\frac{\mu_0 m}{2\pi z^3} \cdot \operatorname{sen}(90-\alpha) = B_0 \operatorname{sen}\alpha$$

$\vdots$

③ a) $F_B = q \not{v} B = \dfrac{m v^{\not 2}}{R}$ $\qquad B = 0{,}5G$

$B = 0{,}5 \times 10^{-4} \Rightarrow \boxed{B = 5 \times 10^{-5} T}$

$$B \cdot e = \frac{m v}{R} \quad \therefore \quad v = \frac{\omega}{R}$$

$$B \cdot e = m\omega \Rightarrow \omega = \frac{B \cdot e}{m} \Rightarrow \omega = \frac{5\times10^{-5} \cdot 1{,}6\times10^{-19}}{9{,}1\times10^{-31}} \Rightarrow$$

$$\omega = \frac{8\times10^{-24}}{9{,}1\times10^{-31}} \Rightarrow \boxed{\omega = 8{,}79\times10^{6}\ rad}$$

$$\nu = \frac{\omega}{2\pi} \Rightarrow \nu = \frac{8{,}79\times10^{6}}{2\pi} \Rightarrow \boxed{\nu = 1{,}4\times10^{6}\ Hz}$$

b) $E = 1\ keV$

$$E = \frac{1}{2} m v^2 \Rightarrow v = \sqrt{\frac{2Ec}{m}} \Rightarrow v = \sqrt{\frac{2 \cdot 1000 \cdot 1{,}6\times10^{-19}}{9{,}1\times10^{-31}}} \Rightarrow$$

$$\boxed{v = 18{,}75\times10^{6}\ m/s}$$

Como: $r = \dfrac{mv}{qB} \Rightarrow r = \dfrac{9{,}1\times10^{-31} \cdot 18{,}75\times10^{6}}{1{,}6\times10^{-19} \cdot 5\times10^{-5}} \Rightarrow$

$$\boxed{r = 2{,}1\ m}$$