

Chapter 28 [0, 15, 20, 30, 40, 47].

10.



$$(a) F = BIl = 4 \times 3.5 \times 2 = 28 \text{ N}$$

$$\sum F_x = 28 \text{ N} \quad - 28 \text{ N}$$

$$(b) \sum F_x = 0$$

15

$$(a) R = \frac{mv}{qB}$$

$$T = \frac{2\pi r}{v} = \frac{2\pi m}{qB}$$

$$f = \frac{qB}{2\pi m} = 1.96 \times 10^8 \text{ Hz}$$

$$(b) r = \sqrt{\frac{2Kz}{m}}$$

$$R = \frac{1}{qB} \sqrt{2mkz}$$

$$\text{At } R = 0.66 \text{ m}$$

20. $r = 0.15 \text{ m}$ $I = 3.2 \text{ A}$ $B = 12 \text{ T}$

(a) $\mu = N i A = 1 \times 3.2 \times \pi \cdot 1^2 = 0.226 \text{ J/T}$

(b) $\tau = \vec{\mu} \cdot \vec{B} = 1.78 \text{ J}$

30. $I = 7 \text{ A}$



$$\vec{F} = B \int i dL = \int_1^3 8x^2 \times 7 dx$$

$$= 56 \int_1^3 x^2 dx = 56 \left(\frac{1}{3} x^3 \right) \Big|_1^3 = 56 \left(9 - \frac{1}{3} \right)$$

$$= 56 \left(\frac{26}{3} \right) \times 10^{-3}$$

$$= 0.49 \text{ N}$$

46. $\vec{\mu} = 0.2 \text{ J/T}$ $B = 4.6 \times 10^{-2} \text{ T}$ $E_K = 8 \times 10^{-4} \text{ J}$

$$-\mu_B (-\cos \theta_2 + \cos \theta_1) = E_K$$

(a) $\therefore \cos \theta_2 = \frac{E_K}{\mu_B} + \cos \theta_1 = \frac{8 \times 10^{-4}}{2 \times 4.6 \times 10^{-2} \times 1.2 \times 10^{-3}} + 1 = 8.7 \times 10^{-2} + 1 = 1.087$

$$\therefore \cos \theta \approx 0.013 \quad \theta \approx 89^\circ$$

(b) 83°

47.

~~$qVB = \frac{1}{2} m v^2$~~ ~~$NIA = \mu$~~ ~~$\mu \cdot B = \frac{1}{2} m v^2$~~

$$e \cdot I = e v_d \cdot A \quad \text{and } v_d = \frac{I}{n e A} \quad \therefore n = \frac{B I}{v_d e}$$

$$E' \propto V = 3.64 \times 10^{-5} \text{ V}$$