Suggested problems: Chapter 28- HRW-Principles of Physics- ISV 10th Edition

18. An electron is accelerated from rest by a potential difference of 380 V. It then enters a uniform magnetic field of magnitude 200 mT with its velocity perpendicular to the field. Calculate (a) the speed of the electron and (b) the radius of its path in the magnetic field.?

Answer: (a) 1.16×10^{7} m/s ; (b) 3.16×10^{-4} m

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19. Figure 28-29 shows a rectangular 28-turn coil of wire, of dimensions 10 cm by 5.0 cm. It carries a current of 0.80 A and is hinged along one long side. It is mounted in the *xy* plane, at angle θ = 30° to the direction of a uniform magnetic field of magnitude 0.50 T. In unit-vector notation, what is the torque acting on the coil about the hinge line?

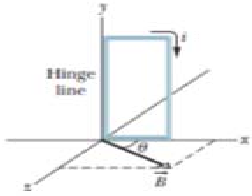

Fig. 28.29 Prob. 19

Answer: (- 5.1 x10^{-2} N.m)***j***

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21. A 6.75 g wire of length L = 15.0 cm is suspended by a pair of flexible leads in a uniform magnetic field of magnitude 0.440 T (Fig. 28-30). What are the (a) magnitude and (b) direction (left or right) of the current required to remove the tension in the supporting leads?

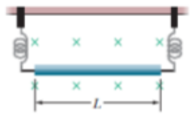

Fig. 28-30 Prob 21

Answer: (a) 1.0 A ; (b) From left to right

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29. A circular coil of 500 turns has a radius of 1.90 cm. (a) Calculate the current that results in a magnetic dipole moment of magnitude 1.90 A.m². (b) Find the maximum magnitude of thetorque that the coil, carrying this current, can experience in a uniform 35.0 mT magnetic field.

Answer: (a) 3.35 A ; (b) 6.65×10^{-2} N.m.

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50. A proton travels through uniform magnetic and electric fields. The magnetic field $\vec{B} = -3.25\hat{i}\ mT$. At one instant the velocity of the proton is is $\vec{v} = 2000\,\hat{j}\ m/s$. At that instant and in unit-vector notation, what is the net force acting on the proton if the electric field is (a) $4.00\,\hat{k}\ V/m$ (b) $-4.00\,\hat{k}\ V/m$, and (c) $4.00\,\hat{i}\ V/m$?

Answer: (a) (1.68 x 10^{-18} N)***k*** ; (b) (4.00 x 10^{-19} N)***k*** **;(c) (** 6.41x10^{-19} N)ˆi+ (10.4x10^{-19} N) kˆ.

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56. A proton moves through a uniform magnetic field given by $\vec{B} = (10\hat{i} - 20\hat{j} + 25\hat{k})\ mT$. At time t_1, the proton has a velocity given by $\vec{v} = (v_x\hat{i} + v_y\hat{j} + 2.0\frac{km}{s}\hat{k})\ km/s$ and the magnetic force on the proton is $\vec{F}_B = (4.0\times10^{-17}\ N)\hat{i} + (2.0\times10^{-17}\ N)\hat{j}$. At that instant, what are (a) v_x and (b) v_y?

Answer: (a) -4.2×10^{3} m/s ; (b) 8.4×10^{3} m/s