

29-03

0.44-46%

Question 830

A charged particle is projected with velocity v into a region where there exists a uniform electric field of strength E perpendicular to a uniform magnetic field of strength B . If the velocity of the charged particle is to remain constant, the minimum velocity must be

- (a) of magnitude E/B and parallel to B .
- (b) of magnitude B/E and perpendicular to both E and B .
- (c) of any magnitude but at 45 degrees to both E and B .
- (d) of magnitude E/B and parallel to E .
- (e) of magnitude E/B and perpendicular to both E and B .

29-5 A Circulating Charged Particle

29-05

Question 831

A proton with a velocity of 6×10^6 m/s travels at right angles to a magnetic field of 0.5 Tesla. What is the frequency of the proton's orbit?

- (a) 3.6×10^6 Hz.
- (b) 7.6×10^6 Hz.
- (c) 8.4×10^6 Hz.
- (d) 9.0×10^6 Hz.
- (e) 2.1×10^7 Hz.

29-05

Question 832

An electron moving perpendicular to a 50 micro-T magnetic field, goes through a circular trajectory. What is the time required to complete one revolution?

- (a) 420 micro-seconds
- (b) 420 nano-seconds
- (c) 715 nano-seconds
- (d) 840 micro-seconds
- (e) 150 nano-seconds

29-05

Question 833

A deuteron is accelerated from rest through a 10^4 V potential difference and then moves perpendicular to a magnetic field with $B = 1.6$ T. What is the radius of the resulting circular path? [For deuteron: $m = 3.3 \times 10^{-27}$ kg, $q = 1.6 \times 10^{-19}$ C.]

- (a) 13×10^{-3} m.
- (b) 22×10^{-3} m.
- (c) 11×10^{-6} m.
- (d) 36×10^{-3} m.
- (e) 15×10^{-4} m.

29-05

0.40-40%

Question 834

What uniform magnetic field, applied perpendicular to a beam of electrons moving at 1.4×10^6 m/s is required to make the electrons travel in a circular orbit of radius 0.40 m?

- (a) 3.0×10^{-5} T.
- (b) 1.0×10^{-5} T.
- (c) 5.0×10^{-5} T.
- (d) 2.0×10^{-5} T.
- (e) 7.0×10^{-5} T.

29-05

Question 835

Particle #1 (of mass m and charge q) and another particle #2 (of mass $3m$ and charge q) are accelerated through a common potential difference V . The two particles enter a uniform magnetic field B along a direction perpendicular to B . If particle #1 moves in a circular path of radius r_1 , then the radius r_2 of the circular path of particle #2 is:

- (a) $r_1 \sqrt{2}$.
- (b) $r_1 \sqrt{6}$.
- (c) $2.0 r_1$.
- (d) $r_1 \sqrt{3}$.
- (e) $r_1 \sqrt{5}$.

29-05

0.56-51%

Question 836

An electron with a kinetic energy of 1.5 keV circles in a plane perpendicular to a uniform magnetic field. The radius of the orbit is 20 cm. Find the magnitude of the magnetic field.

- (a) 2.5×10^{-5} T
- (b) 6.5×10^{-4} T
- (c) 4.7×10^{-4} T
- (d) 8.4×10^{-4} T
- (e) 3.0×10^{-4} T

29-05

0.41-55%

Question 837

An electron moving at right angle to a uniform magnetic field completes a circular orbit in 10^{-8} s. What is the magnitude of the magnetic field.

- (a) 4.2×10^{-3} T.
- (b) 3.6×10^{-3} T.
- (c) 2.5×10^{-3} T.
- (d) 6.3×10^{-3} T.
- (e) 1.0×10^{-3} T.

29-05

0.41-24%

Question 838

Figure 6 shows the circular paths of an electron and a proton that travel at the same speed in a uniform magnetic field B , which points into the page. (a) Which particle follows the bigger circle, and (b) does that particle travel clockwise or counterclockwise?

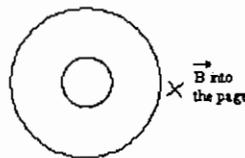


Figure 6

- (a) Not enough information given.
- (b) (a) electron (b) clockwise
- (c) (a) electron (b) counterclockwise
- (d) (a) proton (b) counterclockwise
- (e) (a) proton (b) clockwise