Chapter 29 Magnetic Fields

29-1 The Magnetic field

29-01

Question 802 0-10-42%

A loop of wire carrying a current of 2.0 A is in the shape of a right-angle triangle with two equal sides, each 15 cm long. A 0.70-T uniform magnetic field is in the plane of the triangle and is directed as shown in figure 7. The magnetic force on side 3 is :

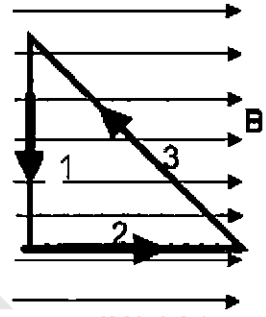


FIGURE 7

(a) 0.21 N, out the page
(b) 0.30 N, out of the page
(c) 0.30 N, into the page
(d) zero
(e) 0.21 N, into of the page

29-2 The Definition of B

29-02

Question 803

A charged particle moves in the positive x-direction with velocity v. If there is a magnetic field into the page, then the kinetic energy of the particle will

(a) be negative.
(b) oscillate.
(c) remain constant.
(d) decrease.
(e) increase.

29-02

Question 804

Which statement is WRONG:

(a) If an electron is deflected to the left by a magnetic field, a proton in the same field will deflect to the right.
(b) A straight current carrying wire aligned parallel to a magnetic field will experience no force.
(c) The force experienced by a moving charge in a magnetic field is directed tangentially to the magnetic field lines.
(d) The force due to a magnetic field on a moving charge does not change the energy of the charge.
(e) Magnetic field lines have no beginning or end.

29-02
0.55-47%

Question 805

An electron is projected into a uniform magnetic field B = (1.4i + 2.1j) T. Find the force on the electron when the velocity is v = (3.7*10**5 j) m/sec (i, j and k are the unit vectors in the x, y and z directions, respectively).

(a) (8.3*10**(-14) k) N
(b) (5.2*10**(-15) i) N
(c) (1.2*10**(-13) i) N
(d) ZERO
(e) (7.8*10**(-15) k) N

29-02
0.36-41%

Question 806

Which one of the following statements is TRUE A magnetic field cannot

(a) change the kinetic energy of a moving charged particle.
(b) accelerate a moving charged particle.
(c) be directed perpendicular to the velocity of the particle.
(d) exert a force on a moving charged particle.
(e) change the momentum of a moving charged particle.

29-02

Question 807

Find the CORRECT statement in the following: A magnetic field applies a force on a charged particle located within it:

(a) if the charge is moving parallel to the magnetic field lines.
(b) if the charge is moving not parallel to the magnetic field lines.
(c) never.
(d) always.
(e) if the charge is at rest.

29-02

Question 808

An electron is projected into a uniform magnetic field B = (1.4i + 2.1j) T. Find the force on the electron when the velocity is v = (3.7*10**5 j) m/sec. respectively).

(a) (1.2*10**(-13) i) N.
(b) (5.2*10**(-15) i) N.
(c) ZERO.
(d) (8.3*10**(-14) k) N.
(e) (7.8*10**(-15) k) N.

29-02

Question 809

An electron is projected into a uniform magnetic field B = (0.8 k) T. Find the magnitude of the magnetic force, on the electron when the velocity is:

v = (5.0*10**5 i + 3.0*10**5 j) m/sec.

(i, j and k are the unit vectors in the x, y and z directions, respectively).

(a) 7.8*10**(-18) N.
(b) ZERO.
(c) 7.5*10**(-14) N.
(d) 5.2*10**(-15) N.
(e) 1.2*10**(-13) N.

29-02

Question 810

In figure (4), a loop of wire carrying a current, I, of 2.0 A is in the shape of a right triangle with two equal sides, each 15 cm long. A 0.7 T uniform magnetic field is in the plane of the triangle and is perpendicular to the hypotenuse. The resultant magnetic force on the two equal sides is:

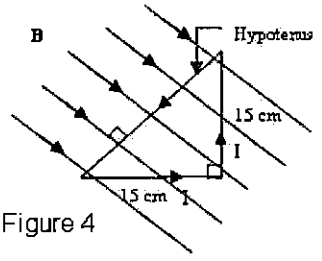


Figure 4

(a) 0.30 N, out of the page.
(b) 0.30 N, into the page.
(c) 0.41 N, out of the page.
(d) 0.41 N, into the page.
(e) Zero.

29-02

Question 811 0.45-36%

What is the initial direction of the deflection of an electron, moving in the y direction as it enters the magnetic field shown in figure (7)? [The magnetic field is in the xy-plane and makes an angle of 45 degrees with the x axis].

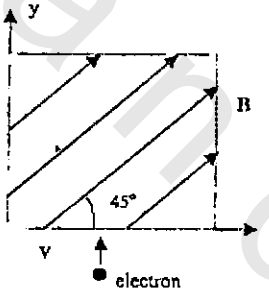


Figure (7)

(a) 45 degrees with the x direction.
(b) out of the page.
(c) y direction.
(d) 45 degrees with the y direction.
(e) into the page.

29-02

Question 812 0.30-21%

An electron moves in the positive x direction, through a uniform magnetic field B pointing in the negative y direction, as shown in figure 7. The magnetic force on the electron is

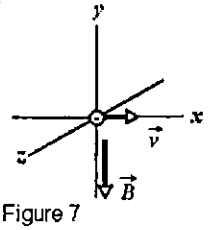


Figure 7

(a) in the negative z direction.
(b) in the positive z direction.
(c) in the positive y direction.
(d) in the negative x direction.
(e) in the negative y direction.

29-02

Question 813 0.45-27%

An electron that has velocity v = 3.2*10**7 i m/s traveling parallel to a uniform magnetic field of strength 2.60*10**(-3) Tesla. The force on the electron is: [i is the unit vectors in the directions of x]

(a) 5.0*10**(-15) N.
(b) 1.4*10**(-15) N.
(c) 2.3*10**(-15) N.
(d) zero.
(e) 6.1*10**(-15) N.

29-02

Question 814 0.36-61%

The path of a charged particle in a magnetic field, when its direction of motion is not at right angle to the magnetic field, will be a:

(a) circle.
(b) helix.
(c) parabola.
(d) straight line.
(e) hyperbola.

29-02

Question 815 0.39-55%

At a point in a uniform magnetic field the acceleration of an electron is 5.0*10**14 m/s**2 and its speed is 7.0*10**6 m/s. If the magnitude of the magnetic field is 1.0 mT, what is the angle between the electrons velocity and the magnetic field?

(a) 29 degrees.
(b) 90 degrees.
(c) zero degrees.
(d) 45 degrees.
(e) 24 degrees.

29-02

Question 816 0.60-39%

A proton moves with constant velocity, v = (8.0*10**5 m/s) i, through crossed electric and magnetic fields. If the magnetic field is B = (2.5 mT) j, what is the electric field? [i, j and k are the unit vectors in the positive x, y and z directions, respectively].

(a) (-1.0 kV/m) k.
(b) (+1.0 kV/m) j.
(c) (-2.0 kV/m) k.
(d) (-2.5 kV/m) i.
(e) (+2.0 kV/m) k.

29-02

Question 817 0.11-75%

Which one of the following statements is FALSE (NOT TRUE). A uniform magnetic field

(a) accelerates a moving charge.
(b) exerts a force on a moving charge.
(c) changes the momentum of a moving charge.
(d) of the earth is a measurable quantity.
(e) changes the kinetic energy of a charge.

29-02

Question 818 0.19-72%

Two particles move through a uniform magnetic field that is directed out of the page as shown in figure 5, which also shows the paths taken by the two particles as they move through the field. The particles are not subject to any other forces or fields. Which one of the following statements is CORRECT?

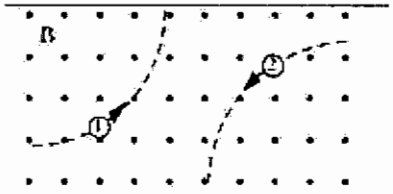


Figure 5

(a) Particle 1 is negative, but particle 2 is positive.
(b) The particles may both be neutral.
(c) Both particles are negatively charged.
(d) Both particles are positively charged.
(e) Particle 1 is positive, but particle 2 is negative.

29-02

Question 819 0.43-59%

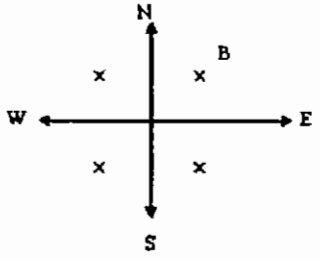
A proton moves through uniform magnetic and electric fields. The magnetic field is B = -3.0 i (mT) and the electric field is E = +4.0 k (V/m). At one instant, the velocity of the proton is v = +250 j (m/s). At that instant, what is the magnitude of the net force on the proton? (i, j and k are the unit vectors along the x, y and z directions, respectively)

(a) 6.1*10**(-19) N
(b) 6.5*10**(-19) N
(c) 7.6*10**(-19) N
(d) 1.2*10**(-19) N
(e) 5.2*10**(-19) N

29-02

Question 820 0.29-62%

In figure 5, an electron moves toward the west at speed of 1.0*10**7 m/s in a downward (normal into the page) uniform magnetic field of 3.0*10**(-4) T. The magnetic force on the electron is



Figure(5)

(a) 4.8*10**(-16), west.
(b) 1.6*10**(-16), north.
(c) 1.6*10**(-16), south.
(d) 4.8*10**(-16), north.
(e) 4.8*10**(-16), south.