Chapter 29

Question 1
Which of the following statements is CORRECT ?

a It is impossible for a constant magnetic field to change the speed of a charged particle.
b A magnetic field exerts a force on an electron at rest.
c The magnetic field at the center of a current carrying conducting tube is non-zero.
d An emf can be induced by a constant magnetic field in a fixed conducting loop.
e The magnetic field inside an ideal solenoid depends on the radius of the solenoid.

Question 2
A cylindrical conductor of radius R = 2.50 cm carries a current of I = 2.50 A along its length. This currents is uniformly distributed throughout the cross section of the conductor. Calculate the magnitude of the magnetic field at a point that is 1.25 cm from the axis of the conductor.

a 20.0 microTesla
b zero
c 8.00 microTesla
d 10.0 microTesla
e 15.3 microTesla

Question 3
Consider two solenoids, A and B, having the same current. Solenoid B has twice the radius and six times the number of turns per unit length as solenoid A. The ratio of the magnetic field in the interior of solenoid B to that in the interior of solenoid A is:

a 6.
b 4.
c 3.
d 2 .
e 1.

Question 4
Solenoid 2 has twice the radius and 20 times the number of turns per unit length as solenoid 1. If the current in solenoid 2 is one fifth (1/5) the current in solenoid 1, then the ratio of the magnetic field in the interior of 2 to that in the interior of 1 is:

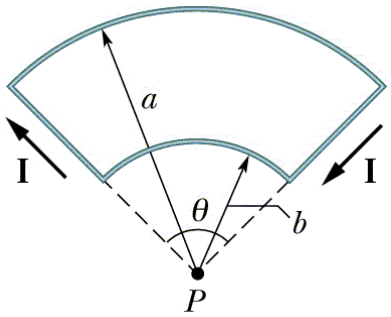
a 4
b 1/4
c 20
d 1/5
e 5

Question 5
Three parallel wires lie in the xy-plane. The separation between adjacent wires is 0.1 m, and each wire carries a 10-A current in the same direction. Find the magnitude of the net force per unit length on one of the outer wires.

a 5.0*10**(-7) N/m.
b 6.0*10**(-4) N/m.
c 1.1*10**(-4) N/m.
d 7.5*10**(-4) N/m.
e 3.0*10**(-4) N/m.

Question 6
Consider the current-carrying loop shown in figure 9 with a = 10.0 cm, b = 5.00 cm, theta = 60.0 degrees and I = 0.200 A. Find the magnitude and direction of the magnetic field at P.

a 5.32*10**(-7) T into the page
b 2.09*10**(-7) T out of the page
c 6.98*10**(-7) T out of the page
d 4.18*10**(-7) T into the page
e 6.28*10**(-7) T out of the page



Question 7
Four long straight wires carry equal currents into page as shown in Figure 6. The magnetic force exerted on wire “A” is:

a East.
b South.
c North.
d Zero.
e West.

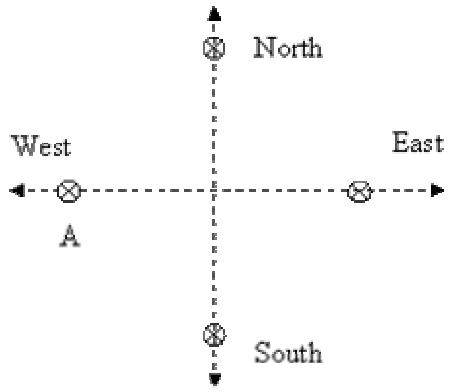
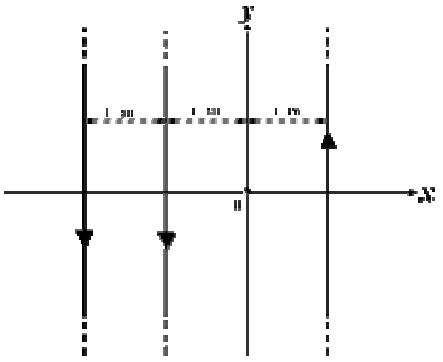


Figure 6

Question 8
Three long wires parallel to the y-axis carry currents as shown in figure 8.
If I = 10 A, find the magnetic field at the origin.

a zero
b 5.0 micro-Tesla out of the page
c 12 micro-Tesla out of the page
d 5.0 micro-Tesla into the page
e 12 micro-Tesla into the page



Question 9
Solenoid 2 has twice the radius and six times the number of turns per unit length as solenoid 1. If they have the same current, then the ratio of the magnetic field in the interior of 2 to that in the interior of 1 is:

a 3.
b 6.
c 1/3.
d 2.
e 12.

Question 10
Two parallel wires, carrying equal currents of 10 A, attract each other with a force F. If both currents are doubled, and the distance between them reduced by 50%, the new force will be:

a F/4.
b 4*F.
c 8*F.
d 16*F.
e F.

Question 11
A circular loop of radius 0.1 m has a resistance of 6 Ohms. If it is attached to a 12 V battery, how large a magnetic field is produced at the center of the loop?

a 3.0*10**(-5) T.
b 5.2*10**(-5) T.
c 0.5*10**(-5) T.
d zero.
e 1.3*10**(-5) T.

Question 12
The segment of wire is formed into the shape as shown in Figure 7 and carries a current I = 6 A. When R = 6.28 cm, what is the magnetic field at the point P?

a 3.0*10**(-5) T into the page.
b 6.1*10**(-5) T into the page.
c Zero.
d 6.1*10**(-5) T out of the page.
e 3.0*10**(-5) T out of the page.

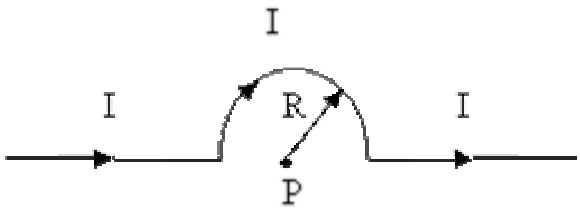
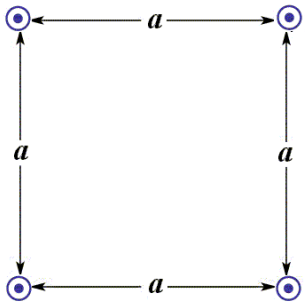


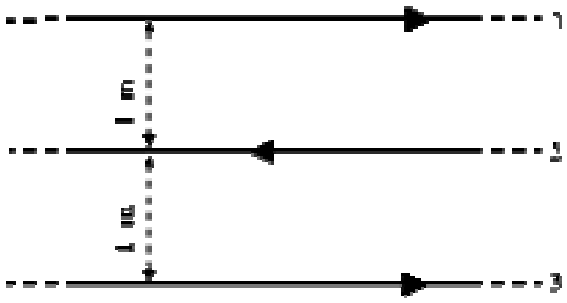
Figure 7

Question 13
Four long conducting wires are parallel to each other. Their cross sections form the corners of a square of side a = 15 cm. The directions of the currents are as shown in figure 10. The magnitude of the current in each wire is 15 A. What is the magnitude of the magnetic field at the center of the square ?



a 1.1*10**(-4) T
b 8.4*10**(-5) T
c 5.7*10**(-5) T
d 2.8*10**(-5) T
e zero

Question 14
Three parallel wires lie parallel to the x-axis as shown in figure 9. The separation between adjacent wires is 1.0 m, and each wire carries a 20-A current. Find the magnitude of the net force per unit length on wire 2 due to wires 1 & 3.



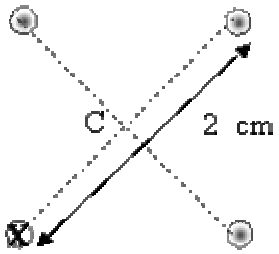
a 7.5*10**(-4) N
b 80*10**(-6) N
c 4.6*10**(-4) N
d 16*10**(-5) N
e zero

Question 15
Which one of the following statements is True?

a If the current in each of two parallel current-carrying wires is doubled, the force between them will be doubled.
b The torque on a magnetic dipole is zero when it is in a uniform magnetic field.
c A uniform magnetic field can be found at the center of a solenoid.
d The magnetic field is smallest where the field lines are closest.
e The magnetic field due to a long straight wire increases with increasing distance from the wire.

Question 16

Figure (10) shows four long straight wires passing through the plane of the paper. They are fixed at the corners of a square of diagonal 2.0 cm. Each wire carries a current of 2 A. Three of them are out of the paper and one is into the paper. The magnitude of the magnetic field at the center "C" of the square has magnitude:



a zero.
b 5.1*10**(-6) T.
c 8.0*10**(-5) T.
d 3.0*10**(-5) T.
e 1.0*10**(-5) T.

Question 17

A solid cylindrical conducting wire has a radius of 15 cm. An electric current is uniformly distributed over the wire with a current density of 1.0*10**4 A/m**2. What is the magnitude of the magnetic field at a point 5.0 cm from the axis of the wire ?

a 9.0*10**(-4) T
b 7.5*10**(-4) T
c 6.3*10**(-4) T
d 3.1*10**(-4) T
e zero

Answers

1	a
2	d
3	a
4	a
5	e
6	b
7	a
8	b
9	b
10	c
11	e
12	a
13	e
14	e
15	c
16	c
17	d