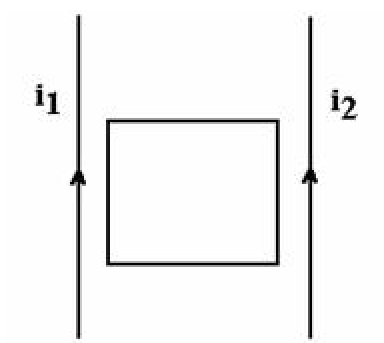
Chapter 30

Question 1
A square loop of wire lies in the plane of the page. A decreasing magnetic field is directed into the page. The induced current in the loop:

a is counterclockwise.
b is clockwise in two of the loop sides and counterclockwise in the other two.
c depends upon whether or not B is decreasing at a constant rate
d is clockwise.
e is zero.

Question 2
A rectangular loop of wire is placed midway between two long straight parallel conductors as shown in figure (11). The conductors carry currents i1 and i2 as indicated. If i1 is increasing and i2 is constant, then the induced current in the loop is:

a depends on i1 + i2.
b counterclockwise.
c zero.
d depends on i1 - i2.
e clockwise.



Question 3
A 200-turn coil has a cross sectional area of 0.20 m**2 and a resistance of 20 ohms. The coil is placed in a magnetic field perpendicular to the plane of the coil.
The magnitude of the magnetic field decreases from 1.6 milli-T to zero in 0.020 seconds. What is the current induced in the coil ?

a 32.0 mA
b 3.20 mA
c 16.0 mA
d 160 mA
e 0.800 mA

Question 4
A long straight wire is in the plane of a rectangular conducting loop as shown in Figure 8. The straight wire carries an increasing current “i” in the direction shown. The current in the rectangular is:

a counter clockwise in the left side and clockwise in the right side.
b zero.
c counter clockwise.
d clockwise.
e clockwise in the left side and counter clockwise in the right side.

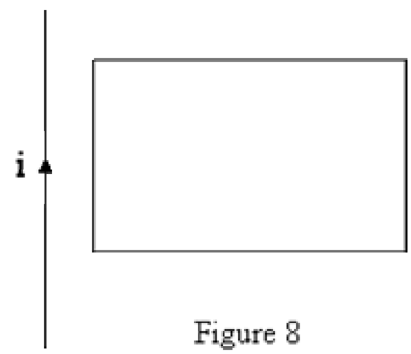


Figure 8

Question 5
The circuit shown in figure 9 is in a uniform magnetic field that is into the page and is decreasing in the magnitude at the rate of 150 T/s. The current in the circuit is:

a 0.15 A.
b 0.22 A.
c 0.18 A.
d 0.62 A.
e 0.40 A.

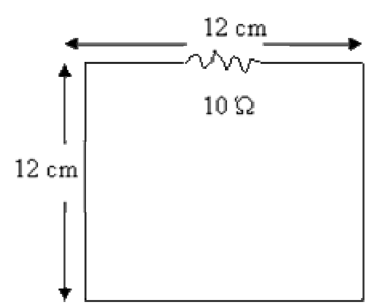
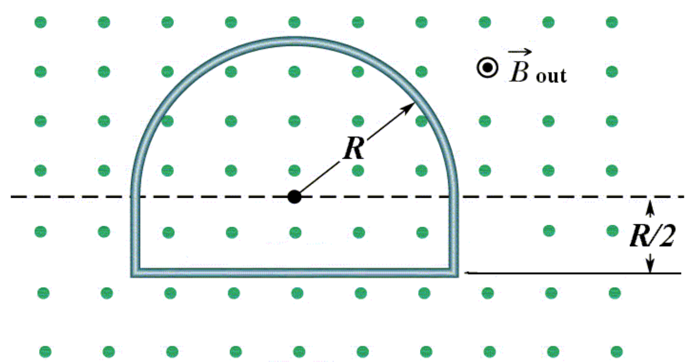


Figure 9

Question 6
Figure 12 shows a conducting loop consisting of a half circle of radius 0.20 m and three straight sections. The loop lies in a uniform magnetic field that is directed as shown in the figure and is given by: B = (4.5*t**2) - (10*t) , with B in tesla and t in seconds. What is the magnitude of the induced emf at t = 10 s ?

a 10 V
b 5.0 V
c 4.1 V
d 6.3 V
e 8.2 V



Question 7
A 2.0-T uniform magnetic field (in the x-y plane) makes an angle of 30 degrees with the y-axis. The magnetic flux through a 4.0-m**2 portion of the xz plane is:

a 6.9 Wb
b 4.0 Wb
c 12 Wb
d 3.0 Wb
e 8.0 Wb

Question 8
Figure 10 shows a bar moving to the right on two conducting rails. To make an induced current in the direction indicated, a constant magnetic field in region "A" should be in what direction?

a Left.
b Impossible; this cannot be done

with a constant
magnetic field.
c Right.
d Out of the page.
e Into the page.

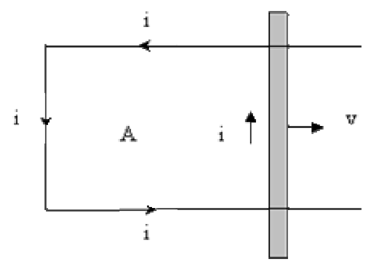
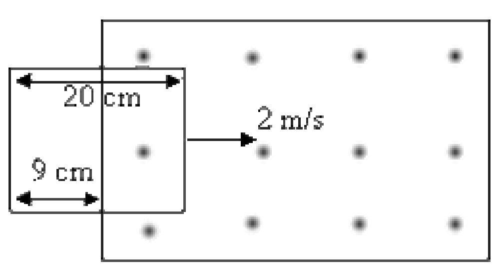


Figure 10

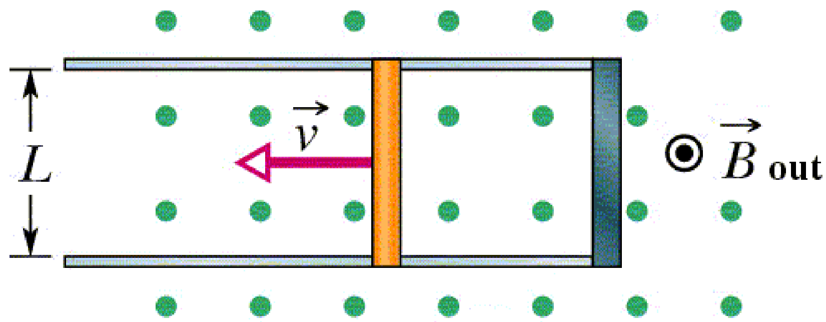
Question 9
The square coil shown in figure(12) is 20 cm on a side and has 15 turns of wire on it. It is moving to the right at 2 m/s. Find the induced emf in it at the instant shown, and the direction of the induced current in the coil. (The magnetic field is 0.2 T and its direction is out of the page.)

a 3.6 V, counter-clockwise
b zero
c 1.2 V, clockwise
d 1.2 V, counter-clockwise
e 3.6 V, clockwise



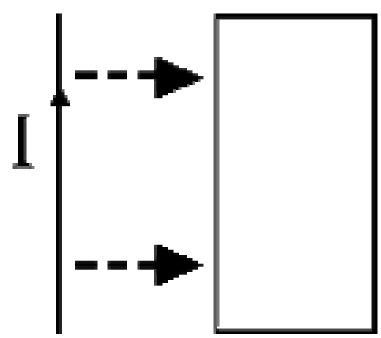
Question 10
A metal rod of resistance 12 ohms is forced to move with constant velocity along two parallel metal rails as shown in figure 13. A magnetic field of magnitude 0.35 T is directed as shown in the figure. The separation between the rails is 25.0 cm and the speed of the rod is 45.0 cm/s. What is the current in the rod ? Neglect the resistance of the rails.

a 1.43 mA counterclockwise
b 1.43 mA clockwise
c 3.28 mA clockwise
d 2.32 mA clockwise
e 3.28 mA counterclockwise



Question 11
A long straight wire is parallel to one edge and is in the plane of a rectangular conducting loop as shown in figure 11. The straight wire carries a constant current. While the wire is being moved toward the loop, the current induced in the loop is

a clockwise.
b decreasing.
c always equal to the current in the wire.
d zero.
e counterclockwise.



Answers

1	d
2	b
3	d
4	c
5	b
6	e
7	a
8	e
9	c
10	c
11	e