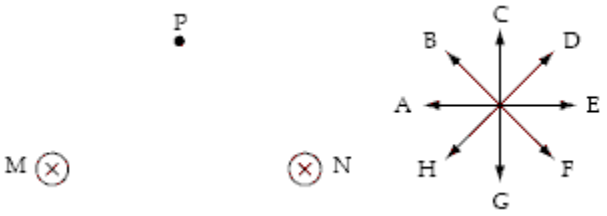
Physics 210 Practice Multiple Choice Problems for week 10

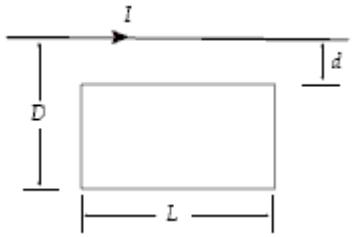
____ 1. Equal currents of magnitude *I* travel into the page in wires M and N. Eight directions are indicated by letters A through H.



The direction of the magnetic field at point P is
a. B.
b. C.
c. D.
d. E.
e. F.

____ 2. A 40-turn circular coil (radius = 4.0 cm, total resistance = 0.20 Ω) is placed in a uniform magnetic field directed perpendicular to the plane of the coil. The magnitude of the magnetic field varies with time as given by $B = 50 \sin(10 \pi t)$ mT where *t* is measured in s. What is the magnitude of the induced current in the coil at 0.10 s?
a. 50 mA
b. 1.6 A
c. 0.32 A
d. zero
e. 0.80 A

____ 3. A loop of wire (resistance = 2.0 mΩ) is positioned as shown with respect to a long wire which carries a current. If $d = 1.0$ cm, $D = 6.0$ cm, and $L = 1.5$ m, what current is induced in the loop at an instant when the current in the wire is increasing at a rate of 100 A/s?



a. 34 mA
b. 30 mA
c. 27 mA
d. 38 mA
e. 0.50 mA

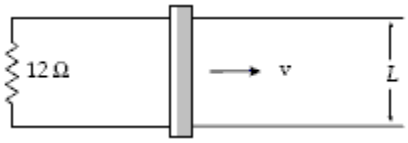
____ 4. A rectangular wire loop (length = 60 cm, width = 40 cm) lies completely within a perpendicular and uniform magnetic field of magnitude of 0.5 T. If the length of the loop starts increasing at a rate of 20 mm/s at time $t = 0$, while the width is decreasing at the same rate, what is the magnitude of the induced emf at time $t = 4.0$ s?

a. 6.8 mV
b. 5.2 mV
c. 3.6 mV
d. 8.4 mV
e. 10 mV

____ 5. A long solenoid ($n = 1500$ turns/m) has a cross-sectional area of 0.40 m^2 and a current given by $I = (4.0 + 3.0t^2)$ A, where t is in seconds. A flat circular coil ($N = 300$ turns) with a cross-sectional area of 0.15 m^2 is inside and coaxial with the solenoid. What is the magnitude of the emf induced in the coil at $t = 2.0$ s?

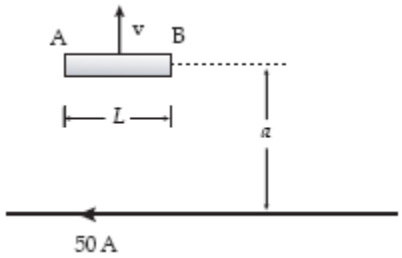
a. 2.7 V
b. 1.0 V
c. 6.8 V
d. 0.68 V
e. 1.4 V

____ 6. A rod (length = 10 cm) moves on two horizontal frictionless conducting rails, as shown. The magnetic field in the region is directed perpendicularly to the plane of the rails and is uniform and constant. If a constant force of 0.60 N moves the bar at a constant velocity of 2.0 m/s, what is the current through the 12-Ω load resistor?



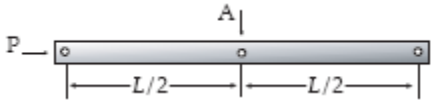
a. 0.32 A
b. 0.34 A
c. 0.37 A
d. 0.39 A
e. 0.43 A

____ 7. A conducting bar moves as shown near a long wire carrying a constant 50-A current. If $a = 4.0$ mm, $L = 50$ cm, and $v = 12$ m/s, what is the potential difference, $V_A - V_B$?



a. +15 mV
b. –15 mV
c. +20 mV
d. –20 mV
e. +10 mV

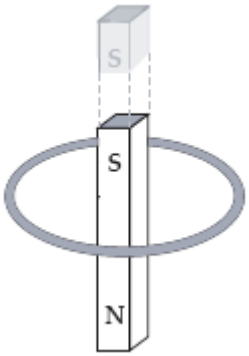
____ 8. A conducting bar of length L rotates with a constant angular speed of +2.0 rad/s about a pivot P at one end, as shown. A uniform magnetic field (magnitude = 0.20 T) is directed into the paper. If L = 0.40 m, what is the potential difference, $V_A - V_P$?



a. –12 mV
b. +8.0 mV
c. –8.0 mV
d. +12 mV
e. –16 mV

____ 9. A current may be induced in a coil by
a. moving one end of a bar magnet through the coil.
b. moving the coil toward one end of the bar magnet.
c. holding the coil near a second coil while the electric current in the second coil is increasing.
d. all of the above.
e. none of the above.

____ 10. A bar magnet is dropped from above and falls through the loop of wire shown below. The north pole of the bar magnet points downward towards the page as it falls. Which statement is correct?



a. The current in the loop always flows in a clockwise direction.
b. The current in the loop always flows in a counterclockwise direction.
c. The current in the loop flows first in a clockwise, then in a counterclockwise direction.
d. The current in the loop flows first in a counterclockwise, then in a clockwise direction.
e. No current flows in the loop because both ends of the magnet move through the loop.

Answer Section

MULTIPLE CHOICE

1. ANS: D PTS: 1
2. ANS: B PTS: 1
3. ANS: C PTS: 1
4. ANS: C PTS: 1
5. ANS: B PTS: 1
6. ANS: A PTS: 1
7. ANS: A PTS: 1
8. ANS: C PTS: 1
9. ANS: D PTS: 1
10. ANS: D PTS: 1