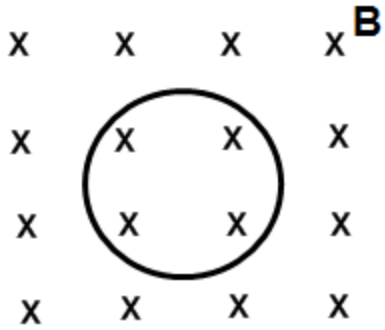
PSI Physics Electro-Magnetic Induction

Multiple Choice Questions

1. A loop of wire is placed in a perpendicular magnetic field. Suddenly, the magnitude of the magnetic field begins to increase, what is the direction of the induced current in the loop?
   A. Clockwise.
   B. Counter-clockwise.
   C. Out of the page.
   D. Into the page.
   E. There is no induced current in the loop.



2. A loop of wire is placed in a perpendicular magnetic field. Suddenly, the magnitude of the magnetic field begins to increase, what is the direction of the induced current in the loop?
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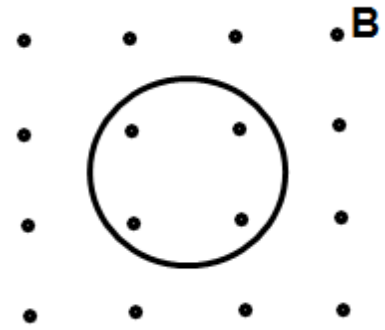
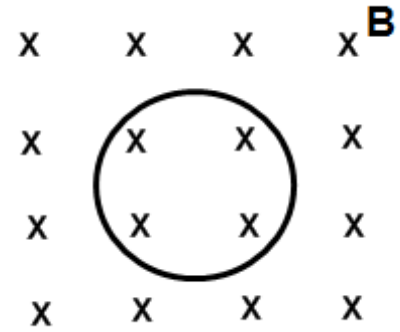


3. A loop of wire is placed in a perpendicular magnetic field. Suddenly, the magnitude of the magnetic field begins to decrease, what is the direction of the induced current in the loop?
   A. Clockwise.
   B. Counter-clockwise.
   C. Out of the page.
   D. Into the page.
   E. There is no induced current in the loop.



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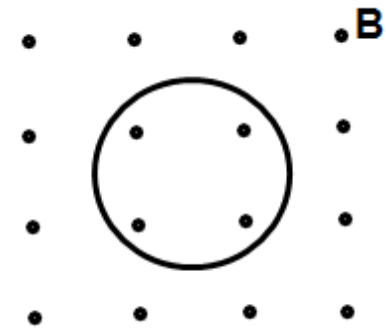
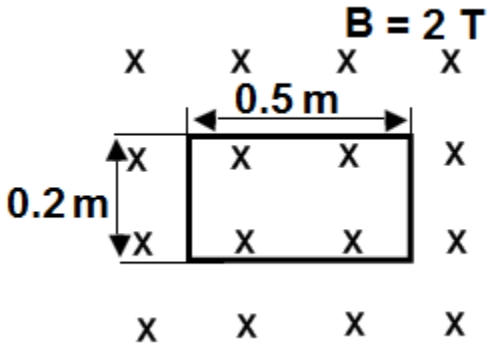


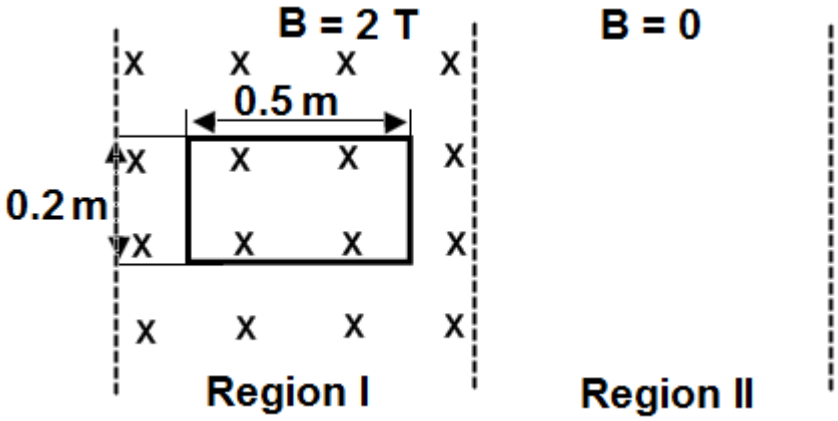
5. A rectangular loop of wire with dimensions 0.2 m x 0.5 m is placed in a uniform magnetic field of magnitude 2 T. The magnetic field is perpendicular to the plane of the loop. What is the magnetic flux in the loop?

A. 0.1 Wb B. 0.2 Wb C. 0.3 Wb
D. 0.4 Wb E. 0.5 Wb



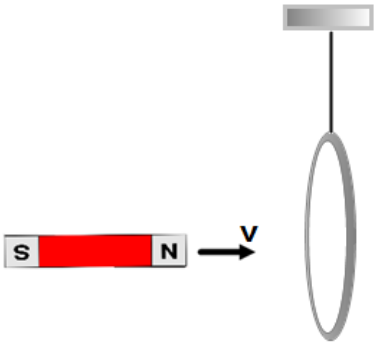
6. A rectangular loop of wire with dimensions 0.2 m x 0.5 m is placed in a uniform magnetic field of magnitude 2 T. The magnetic field is perpendicular to the plane of the loop. The loop is moved from region I to region II in 0.05 s? What is the induced emf in the loop?

A. 1 V B. 2 V
C. 3 V D. 4 V E. 5 V



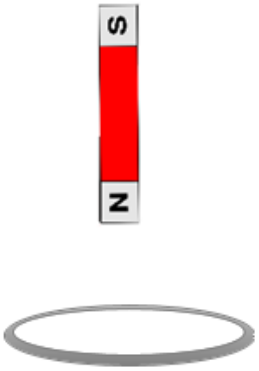
7. A magnet bar is moved toward a vertical conducting ring that is suspended at the end of a string. What happens to the ring during the time when the magnet approaches it?

A. The ring will move toward the magnet.
B. The ring will move away from the magnet.
C. The ring will remain stationary.
D. The ring will tend to turn in clockwise direction.
E. The ring will tend to turn in counter-clockwise direction.

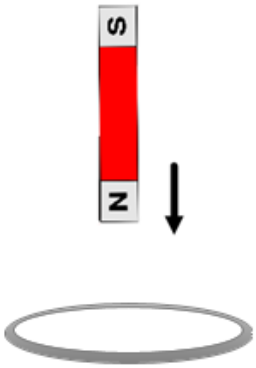


8. A bar magnet with the north pole faced downward is held above a horizontal circular coil. Which of the following statements about the induced current is true (viewed from above)?

A. The induced current flows in a clockwise direction.
B. The induced current flows in a counter-clockwise direction.
C. The induced current flows first in a clockwise and then in a counter-clockwise direction.
D. The induced current flows first in a counter-clockwise and then in a clockwise direction.
E. There is no induced current in the coil.

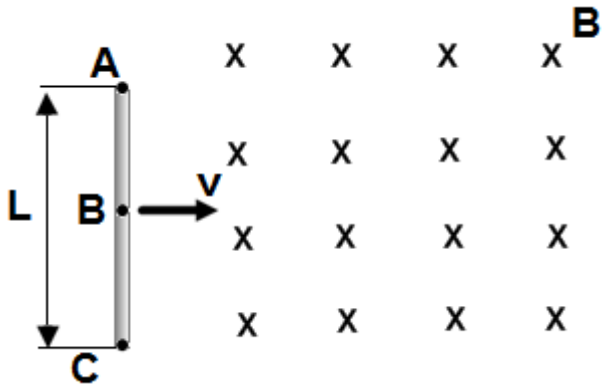


9. A bar magnet with the north pole faced downward is dropped above a horizontal circular coil. Which of the following statements about the induced current is true (viewed from above)?



A. The induced current flows in a clockwise direction
B. The induced current flows in a counter-clockwise direction
C. The induced current flows first in a clockwise and then in a counter-clockwise direction
D. The induced current flows first in a counter-clockwise and then in a clockwise direction
E. There is no induced current in the coil

In the diagram to the right, a metal rod with a length of L moves at a constant velocity through a uniform magnetic field of magnitude B. The magnetic field is perpendicular to the rod. Use this diagram to answer questions 10 though 12.

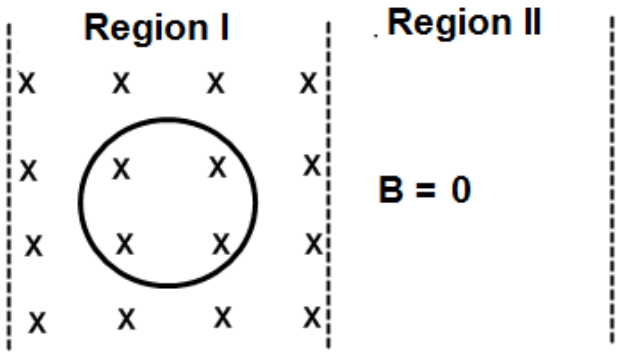


10. Which of the following is true about the electric potential in the rod?
A. Point A has higher potential.
B. Point B has higher potential.
C. Point C has higher potential.
D. Point A and B have the same potential.
E. Point A and C have the same potential.

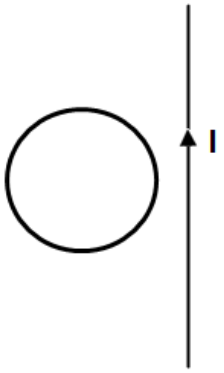
11. What is the potential difference between point A and B?
A. Bv B. vL C. BL D. BLv E. Potential difference is zero

12. What is the induced electric field in the rod?
A. Bv B. vL C. BL D. BLv E. There is no electric field in the rod

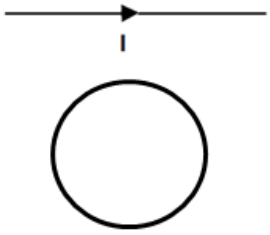
13. A circular loop of wire is placed in a perpendicular uniform magnetic field. Which of the following <u>will not</u> produce an induced current in the loop?
    A. Move the loop to region II.
    B. Rotate the loop with respect to its diameter.
    C. Rotate the loop with respect to its center.
    D. Stretch the loop and change its area.
    E. None from the above.



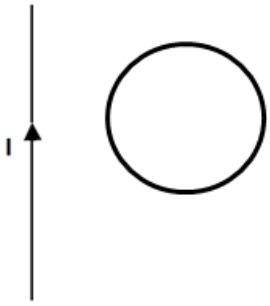
14. A steady current, I, flows though a straight wire. A circular loop of wire is placed next to the wire. Which of the following will not produce an induced current in the loop?
    A. Move the loop away from the wire.
    B. Move the loop toward the wire.
    C. Increase the electric current in the wire.
    D. Decrease the electric current in the wire.
    E. Move the loop in parallel to the wire.

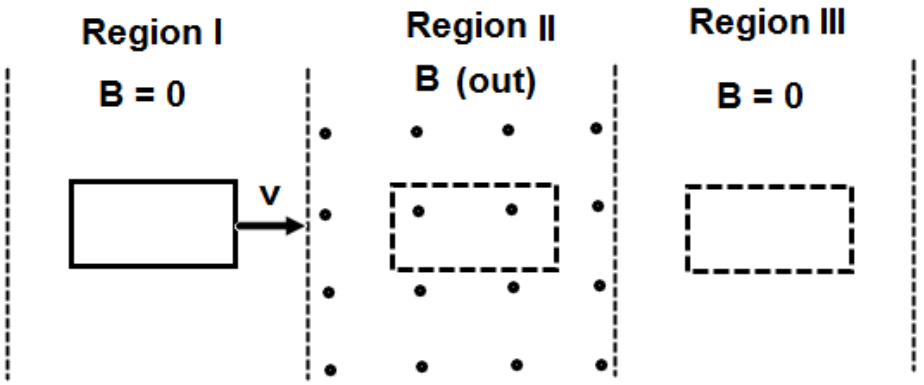


15. A current-carrying wire lies on a horizontal table. A circular coil is placed next to the loop. The current suddenly grows stronger. What is the direction of the induced current in the coil?
    A. Clockwise.
    B. Counter-clockwise.
    C. There is no induced current in the coil.
    D. The induced current changes its direction from clockwise to counter-clockwise.
    E. The induced current changes its direction from counter-clockwise to clockwise.



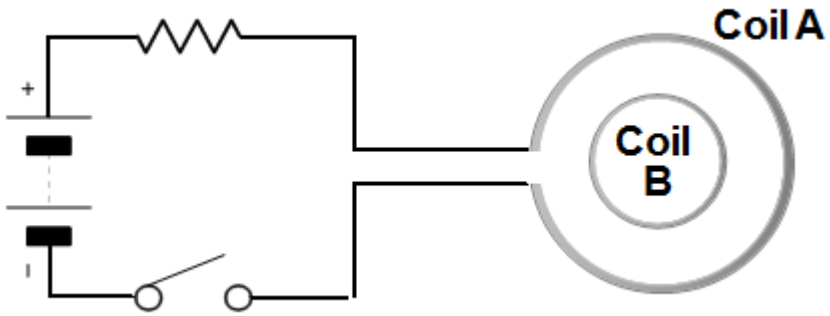
16. A current-carrying wire lies on a horizontal table. A circular coil is placed next to the loop. The current vanishes suddenly. What is the direction of the induced current in the coil?
    A. Clockwise
    B. Counter-clockwise
    C. There is no induced current in the coil
    D. The induced current changes its direction from clockwise to counter-clockwise
    E. The induced current changes its direction from counter-clockwise to clockwise





17. A rectangular loop of wire is moved at a constant speed from region I to region II and then to region III. Which of the following is true about the magnetic force direction acting on the loop when it crosses the boundary between the regions?

	Region I→ Region II	Region II→ Region III
A.	Left	Right
B.	Left	Left
C.	Right	Right
D.	Right	Left
E.	Zero	Zero



18. Coil A is connected to a circuit including: a battery, a switch, and a resistor. Coil B lies in the same plane as coil A. What is the direction of the induced current in coil B at the moment when the switch is closed?
    A. Clockwise.
    B. Counter-clockwise.
    C. There is no induced current in the coil.
    D. The induced current changes its direction from clockwise to counter-clockwise.
    E. The induced current changes its direction from counter-clockwise to clockwise.

Answers

1) B
2) A
3) A
4) B
5) B
6) D
7) B
8) E
9) B
10) A
11) D
12) A
13) C
14) E
15) B
16) A
17) B
18) B