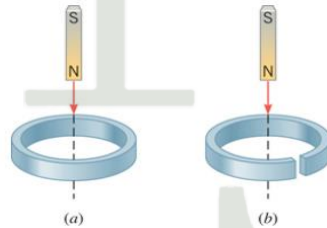


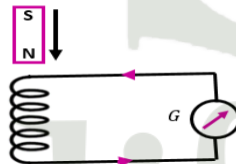
- Define the term electromagnetic induction.
 - What is magnetic flux. Write unit and dimension of magnetic flux.
 - What are Faraday's law of electromagnetic Induction.
 - A coil has 5000 turns. What is the emf produced in the coil when the magnetic flux cuts the coil changes by $8 \times 10^{-4} \text{ wb}$ in 0.1 s ? **[Ans: 40V]**
 - The magnetic flux passing perpendicular to the plane of coil is given by $\phi = 4t^2 + 5t + 2$ where ϕ is in weber and t is in second. Calculate magnitude of instantaneous emf induced in coil when $t = 2 \text{ sec}$. **[21V]**

- Lenz law in electromagnetism gives the direction of induced current.
 - State Lenz's law.
 - Lenz law follows the principle of conservation of energy. Explain.
 - An induced current has no direction of its own. Explain?
 - A copper ring is held horizontally and a bar magnet is dropped through the copper ring, will the acceleration of the falling magnet be equal to, less than or greater than the acceleration due to gravity?
 - A copper ring is suspended by a thread in a vertical plane. One end of a magnet is brought horizontally towards the ring. How will the position of the ring be affected?

- A student asserted that if a permanent magnet is dropped down a vertical copper pipe, it eventually reaches a terminal velocity even if there is no air resistance. Why should this be?
- Explain why the motion of the magnet in part (a) is retarded when the magnet is above the ring and below the ring as well. Draw any induced currents that appear in the ring. Also, explain why the motion of the magnet is unaffected by the ring in part (b)

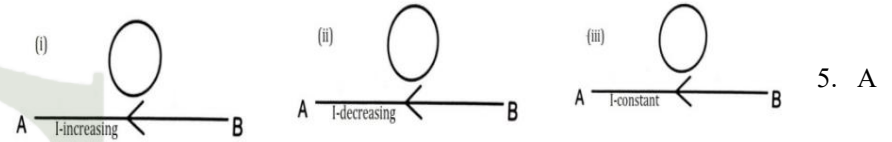


- In fig. a magnet is moving towards one end of a solenoid connected to a sensitive galvanometer. During this movement a current is induced in the solenoid (coil).

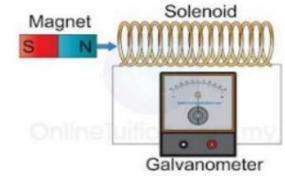


- Suggest three possible changes to the system in the figure that would increase induced current.
- Does the direction of induced current change if the magnet is moved away from the coil? Explain.

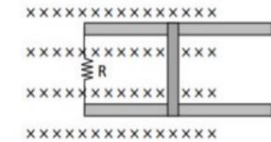
- In what direction do the induced current flows in flowing cases:



simple experiment to study electromagnetic induction is shown in the figure.



- Discuss the deflection produced in galvanometer when you move the magnet towards the coil and away from the coil.
- Mention any two ways of increasing the induced in the above experiment.
- Let the magnetic flux linked with the coil varies as: $\Phi = 5t^2 - 2t + 3$. Obtain the induced current in the coil after 2 s if the resistance of coil is 8Ω .
- A straight conductor of length 25 cm is moving perpendicular to its length with a uniform of 10 m/s making an angle of 45° with a uniform magnetic field of 10 T . Calculate the emf induced across its length. **[Ans: 17.67V]**
 - A 0.25 m long bar moves along the two parallel rails (of negligible resistances) which are connected to a 6Ω resistor as shown in the figure. The system is placed in a uniform magnetic field of flux density 1.20 T acting perpendicularly inwards to plane of paper.



- Why does the current appear in the resistor when the bar is kept in motion along the rails?
 - At certain instant, the current in the resistor is 1.75 A and flowing counter clockwise in the circuit. What is the magnitude and direction of the velocity of the bar at that instant?
- A rectangular coil of 100 turns has dimensions $15 \text{ cm} \times 10 \text{ cm}$. It is rotated at the rate of 300 revolution per minute in a uniform magnetic field of flux density 0.6 T . Calculate the maximum emf induced in it. **[28V]**
 - State the principle of AC generator. Write the expression of emf induced in AC generator. Also sketch the graph showing nature of induced emf in AC generator.
 - The armature of a small generator consists of a flat, square coil with 120 turns and sides with a length of 1.60 cm . the coil rotates in a magnetic field of 0.0750 T . What is the angular speed of the coil if the maximum emf produced is 24 mV ?
 - What is eddy current and explain how they arise? Give few examples where eddy currents are useful and harmful.