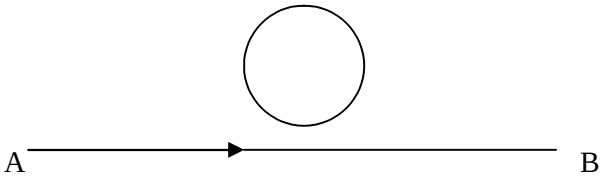
Class: XII Physics Assignment 4 : Electromagnetic Induction and Alternating Currents

1 mark question

1. The current passing through the wire A, B is increasing. In which direction does the induced current flow in the closed loop.

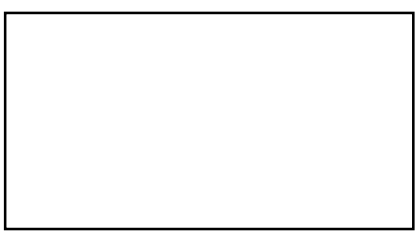


2. State Faraday's Law of electromagnetic induction. Express it mathematically.
3. State Lenz Law. On which law of conservation is it based?
4. How are eddy currents produced?
5. Power factor of an a.c. circuit is 0.5. What will be the phase difference between voltage and current in the circuit?
6. What is the significance of a Q-factor in a series LCR resonant circuit?
7. What is the principle of a.c. generator?
8. What is the power consumed in (i) purely inductive and (ii) purely capacitive a.c. circuits?
9. Draw the graph to show the variation of Xc with the frequency of the a.c. source used.
10. Which is the best method of reducing current in an a.c. circuit and why?
11. If the no of turns of a solenoid is doubled, keeping the other factors constant how does the self-inductance of the solenoid change?
12. Sketch the variation of inductive reactance and capacitive reactance with the frequency of a.c. source.
13. What is the frequency of direct current?
14. What is the relation between peak value and root mean square value of alternating e.m.f.?
15. What is the mean value of an alternating current?
16. When are the voltage and current in LCR-circuit in same phase?

2/3 marks questions

17. a capacitor blocks d.c. Why?
18. The frequency of a.c. source is doubled. How do R, X_L and X_c get affected?
19. Which is more dangerous than d.c. for the same value?
20. A lamp is connected in series with a capacitor. Predict your observation for d.c. and a.c. connections. What happens in each case if the capacitance is reduced?
21. What is the unit of L/R?
22. As soon as the current is switched on in a high voltage wire, the bird sitting on it flies away, Why?
23. Fig shows a bar magnet M falling under gravity through an air cored coil C. Plot a graph showing variation of induced e.m.f. E with time (t). What does the area enclosed by the E-t curve depict? M

24. A rectangular loop of wire is being withdrawn out of the magnetic field with velocity $\vec{v}$. The magnetic field is perpendicular to the plane of paper. What will be the direction of induced current, if any, in the loop?



5 mark questions:-

25. Derive expression for self-inductance of a long air-cored solenoid of length l, radius r and having number of turns N.
26. What do you mean by mutual inductance of two nearby coils? Find an expression for mutual inductance of a solenoid-coil system.
27. Define the term capacitive reactance; show graphically the variation of capacitive reactance with frequency of applied voltage by angle $\pi/2$.

    Describe briefly the principle, construction and working of a transformer. Why is its core laminated?