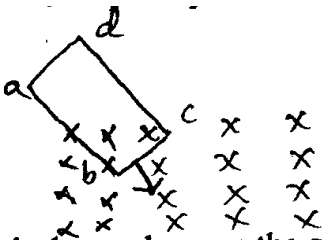
CLASS : XII
PHYSICS ASSIGNMENT

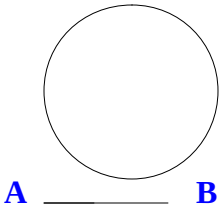
Unit - IV
(a) Electromagnetic Induction

1. State Faraday's Laws of Electromagnetic Induction.
2. Figure below shows planar loop moving into a region of magnetic field which is directed normal to the plane of the loop away from the reader. Determine the direction of induced current using Lenz's law.



3. A small piece of metal wire is dragged across the gap between the pole pieces of a magnet in 0.5s. The magnetic flux between the pole pieces is known to be $8X10^{-4}$ Wb. Estimate the emf induced in the wire.
4. Predict the direction of induced current in the situations described by the following figure. Justify your answer.

5. A Conducting loop is held stationary normal to the field between the NS poles of a fixed permanent magnet. By choosing a magnet sufficiently strong, can we hope to generate current in the loop?
6. A long solenoid with 15 turns per cm has a small loop of area 2.0 cm^2 placed inside normal to the axis of a solenoid. If the current carried by the solenoid changes steadily from 2A to 4A in 0. Is, what is the induced voltage in the loop?
7. Is magnetic flux a scalar or vector? Write SI unit of magnetic flux.
8. State Lenz's law. Does Lenz's law violate the law of conservation of energy?
9. Why are the coils of a resistance box made from doubled up insulated wire?
10. An oscillating magnet stops soon if a metallic plate is placed below it. Why?
11. In the figure, the magnitude of the electric current through the wire AB is increasing. Is there any induced current in the wire loop? If yes, what is its direction?



12. Magnetic flux in a closed circuit of resistance 10Ω varies with time according to the equation $\Phi = 5t^2-4t+1$. Calculate the magnitude of induced current in the circuit at t = 0.2 second.
13. The induced emf is sometimes called backemf? Why?
14. A conductor of length L is moving with velocity v perpendicular to magnetic field B. Write an expression for the induced emf.
15. Two circular coils, one of small radius r_1 and the other of very large radius r_2 are placed coaxially with centres coinciding. Obtain the mutual inductance of the arrangement.

(b) Alternating Current

1.. **The peak valueof an a.c. supply is 300V. What is the rms voltage?**

2. **The rms value of current in an a.c. circuit is 10A. What is the peak current?**

3. **For the circuit drawn below draw the graph showing variation of voltage and current with 'ωt'. Also draw the phasor diagram.**

4. **Define wattles current.**

5. **In the circuit given below, the switch is closed and after sometime an iron rod is inserted into the interior of the inductor. The glow of the bulb will increase or decrease as the iron rod is inserted. Justify your answer.**

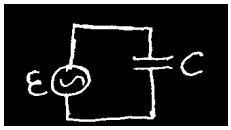
6. **For the given circuit, draw the graph showing variation of voltage and current with 'ωt'. Also draw the phasor diagram**

7. **Distinguish between the terms reactance and impedance for an a.c. circuit.**

8. **In an a.c. circuit, is applied instantaneous voltage equal to the algebraic sum of the instantaneous voltages across the series elements of the circuit? Is the same true for rms voltage?**

9. **Show graphically variation of capacitive reactance with frequency of applied voltage in a.c. circuits.**

10. **For the given circuit draw the graphs showing variation of voltage and current verses 'ωt'. Also draw the phasor diagram**



11. **At an airport, a person is made to walk through the doorway of a metal detector. If he/she is carrying anything made of metal, metal detector emits a sound. On what principle does this metal detector work?**

12. **Explain with labeled diagram principle of a.c. generator.**

13. **Obtain the resonant frequency of a series LCR circuit with L=2H, C=32μf and R=10Ω. What is the Q value of this circuit?**

14. **Explain the principle of transformer. Obtain the relation np/ns = Vp/Vs. Give the circuit symbol of step down transformer.**

15. **A 60μf capacitor, a 0.3H inductor and a 50Ω resistor are connected in series with a 120V-69 Hz a.c. source. Calculate the impedance of the circuit and the current in the circuit. (Ans Z= 85Ω)**