

Electromagnetic Induction Physics class - 12th

Assignment
01

1. Define magnetic flux. Compute its dimensions. When is the magnetic flux taken as (i) positive and (ii) negative ?
2. What is electromagnetic induction ? Give an experiment which demonstrates this phenomenon.
3. State Faraday's laws of electromagnetic induction. Express them mathematically. [CBSE F 17]
4. State Lenz's law. Give one example to illustrate this law. The "Lenz's law is a consequence of the law of conservation of energy". Justify this statement. [CBSE D 09, 17C ; F 17]
5. Describe a simple experiment (or activity) to show that the polarity of emf induced in a coil is always such that it tends to produce a current which opposes the change of magnetic flux that produces it. [CBSE D 14]
6. State Lenz's law. Prove that the charge induced is independent of time.
7. A metallic rod of length l is moved perpendicular to its length with velocity v in a magnetic field $\vec{B}$ acting perpendicular to the plane in which rod moves. Derive the expression for the induced emf. [CBSE OD 17C]
8. Derive an expression for the induced emf produced by changing the area of a rectangular coil placed perpendicular to a magnetic field.
9. A rectangular coil of area A , having number of turns N is rotated at ' f ' revolutions per second in a

uniform magnetic field B , the field being perpendicular to the coil. Prove that the maximum emf induced in the coil is $2\pi f NBA$. [CBSE OD 15]

10. What is electromagnetic damping ? How is a galvanometer made dead beat ?
11. Define the term self-inductance. Write its SI unit. Give two factors on which self inductance of an air core coil depends. [CBSE OD 15]
12. Define the term 'self-inductance'. Give its unit. Write an expression for the energy stored in an inductor when a steady current ' I ' is passed through it. Is this energy electric or magnetic ? [CBSE OD 04C]
13. Define mutual inductance. Write its SI unit. Give two factors on which the coefficient of mutual inductance between a pair of coils depends. [CBSE D 15, OD 15C]
14. Derive the expression for the self-inductance of a long solenoid of cross-sectional area A and length l , having n turns per unit length. [CBSE D 12 ; OD 13C]
15. Derive an expression for the mutual inductance of two long solenoids wound over one another, in terms of their number of turns N_1, N_2 ; common cross-sectional area A and common length l . [CBSE OD 17]
16. Obtain the expression for the mutual inductance of a pair of coaxial circular coils of radii r and R ($R \gg r$) placed with their centres coinciding. [CBSE D 03]