ELECTROMAGNETIC INDUCTION

Test Paper-I

MAX MARKS: 30   **TIME: 90Mts**

| Sl. No.	QUESTION	ANSWER PAGE	MARKS
1	What is Electromagnetic Induction?	Page:204	1
2	What are the different methods of producing current in a coil ?	Page:205	2
3	Define Magnetic flux. Give the expression to find the same. What is its SI unit of measurement? Is it a scalar or vector quantity?	Page:207	2
4	State Faradays laws of electromagnetic Induction?	Page:207	2
5	Give the expression to find the induced emf set up inside a coil. What are the different ways of producing induced emf	Page:208	2

6
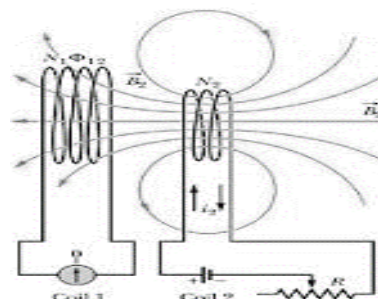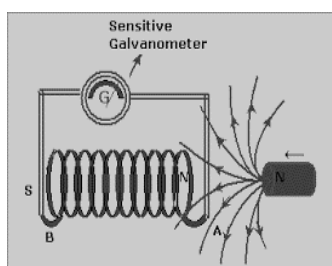
In the above experiments (a) what would you do to obtain a large deflection of the galvanometer? (b) How would you demonstrate the presence of an induced current in the absence of a galvanometer?   **Page:208**

3

7   A square loop of side 10 cm and resistance 0.5Ω is placed vertically in the east-west plane. A uniform magnetic field of 0.10 T is set up across the plane in the north-east direction. The magnetic field is decreased to zero in .070 s at a steady rate. Determine the magnitudes of induced emf and current during this time – interval.   **Page:208**

3

8   A circular coil of radius 10cm, 500 turns and resistance 2Ω is placed with its plane perpendicular to the horizontal component of the earth's magnetic field. It is rotated about its vertical diameter through 180° in 0.25 s. Estimate the magnitudes of the emf and current induced in the coil. Horizontal component of the earth's magnetic field at the place is 3.0×10^{-5} T   **Page:208**

3

9   State Lenz's law   **Page:208**   1

10   Show that Lenz's law is in accordance with the law of conservation of energy. **Page:208**   2

11   A closed loop moves normal to the constant electric field between the plates of a large capacitor. Is a current induced in the loop   2

         a.   When it is wholly inside the region between the capacitor plates

         b.   When it is partially outside the plates of the capacitor?

Electric field is normal to the plane of the loop.   **Page:211**

12   What is motional emf? Derive an expression for finding the same. **Page:212**   2

13

         Page:211   3

         a.   A closed loop is held stationary in the magnetic field between the north and south poles of two permanent magnets held fixed. Can we hope to generate current in the loop by using very strong magnets?

         b.   A rectangular loop and a triangular loop are moving out of a uniform magnetic field region to a field-free region with a constant velocity v. In which loop do you expect the induced emf to be constant during the passage out of the field region? The field is normal to the loops.
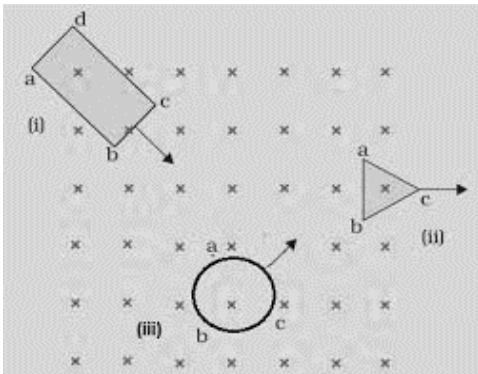
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Figure shows planar loops of different shapes moving out of or into a region of a magnetic field which is directed normal to the plane of the loop away from the reader. Determine the direction of induced current in loops (i) & (ii) using Lenz's law.