# Test (class – 12)

## magnetism and electromagnetic induction

1. The ratio of magnetic fields due to a small bar magnet in the end-on position to that in broad-side on position for the same distance from it is:
   (a) 1 : 4 (b) 1 : 2 (c) 1 : 1 (d) 2 : 1
2. A magnet of magnetic moment M is cut is into two equal parts. The two parts are placed perpendicular to each other so that their north poles touch each other. The resultant magnetic moment is:
   (a) √2M (b) M/√2 (c) √3M (d) M/√3
3. A steel wire of length L has a magnetic moment M. It is then bent into a semi-circular are; the new magnetic moment will be:
   (a) M (b) 2M/π (c) M/L (d) M x L
4. A thin bar magnet of length 2L is bent at the mid-point so that the angle between them is 60°. The new length of the magnet is:
   (a) √2L (b) √3L (c) 2L (d) L
5. Two identical magnets each of moment M are kept at an angle of 60°, such that like poles are touching each other. The magnetic moment of the combination will be:
   (a) M (b) 2M (c) √2M (d) √3M

6. The susceptibility of a diamagnetic substance is:

   (a) infinite (b) zero (c) small but negative (d) small and positive

7. Lenz's law is a consequence of the law of conservation of:

   (a) charge (b) mass (c) momentum (d) energy

8. The law of electromagnetic induction have been used in the construction of a:

   (a) galvanometer (b) voltmeter (c) electric motor (d) generator

9. A cylindrical bar magnet is kept along the axis of a circular coil. On rotating the magnet about the axis, the coil will have induced in it:

   (a) a current (b) no current (c) only an emf (d) both an emf and a current

10. A horizontal straight conductor when placed along south-north direction falls under gravity; there is:
    (a) an induced current from south to north direction
    (b) an induced current from north to south direction
    (c) no induced emf along the length of the conductor
    (d) an induced emf along the length of the conductor

11. A car moves on a plane road. Induced emf produced across the axle is maximum when it moves:

(a) at the poles (c) remains stationary

(b) moves at equator (d) no emf is induced at all

12. A small piece of wire is passed through the gap between the poles of a magnet in 0.1 sec. An emf of $4 \times 10^{-8}$ volt is induced wire. The magnetic flux between the poles (in weber) is:

(a) 10 (b) $4 \times 10^{-9}$ (c) $4 \times 10^{-2}$ (d) 0.1

13. Flux $\phi$ (in weber) in a closed circuit of resistance 10 ohm varies with time $t$ (in sec) according the equation:

$$\phi = 6t^2 - 5t + 1$$

What is the magnitude of the induced current at $t = 0.25$ sec?

(a) 1.2 A (b) 0.8 A (c) 0.6 A (d) 0.2 A ans-d

14. The core of a transformer is laminated so that:

(a) ratio of voltage in the primary and secondary may be increased

(b) energy losses due to eddy currents may be minimized

(c) weight of transformer may be reduced

(d)rusting may be prevented

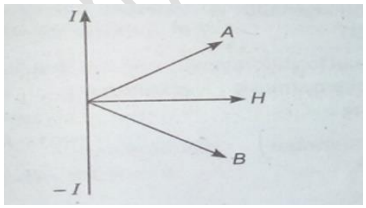
15. Define the term magnetic moment of a current loop . Write the expression for the magnetic moment when an electron revolve at speed v around the orbit of radius r in hydrogen atom .

16 . Define magnetic susceptibility of the materials . Name two elements , one having positive and other having negative susceptibility . what does negative susceptibility signify ?

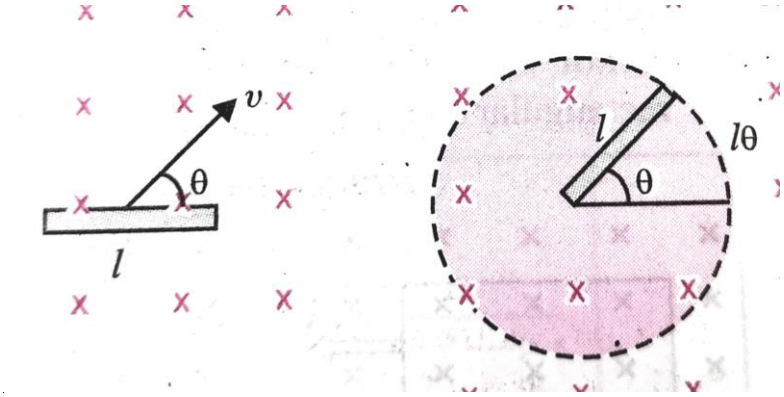
17. A bar magnet of magnetic moment M is aligned parallel to the direction of a uniform magnetic field B. What is the work done to turn the magnet, so as the align its magnetic moment (i) Opposite to the field direction (ii) Normal to the field direction?

18. Two circular coils one of small radius r and other of very large radius R are placed coaxially with center coinciding. Obtain the mutual inductance of the arrangement.

19. The following fig shows the variation of I vs. H for two materials A and B(a) identify the materials A and B (b) draw the variation of susceptibility with temp for B.




20. Calculate the rate at which the flux linked with the generated area area changes with time when a rod of length l is (a) translated (b) rotate in a uniform field of induction B as shown in the figure.




21. A stream of electrons travelling with a speed μ at right angles to a uniform magnetic field B is deflected in a circular part of radius r. Prove that e/m = μ/rB .