Physics

Term 1 part II Revision

Grade : 12 Marks : 25

1. A current carrying circular loop of radius *R* is placed in the $x - y$ plane with centre at the origin. Half of the loop with $x > 0$ is now bent so that it now lies in the $y - z$ plane.
   (A) The magnitude of magnetic moment now diminishes.
   (B) The magnetic moment does not change.
   (C) The magnitude of *B* at (0.0.z), $z >> R$ increases.
   (D) The magnitude of *B* at (0.0.z), $z >> R$ is unchanged.
2. A circular current loop of magnetic moment M is in an arbitrary orientation in an external magnetic field B. The work done to rotate the loop by 30° about an axis perpendicular to its plane is
   (A) MB
   (B) $\frac{\sqrt{3}}{2}$ MB
   (C) 4MB
   (D) zero.
3. When a charge of 1C moving with velocity 1 m/s normal to a magnetic field experiences a force 1 N , then the magnitude of the magnetic field is
   (A) 1 Gauss
   (B) 1 Tesla
   (C) 1 Orested
   (D) None of the above
4. An electron is projected with uniform velocity along the axis of a current carrying long solenoid. Which of the following is true?
   (A) The electron will be accelerated along the axis.
   (B) The electron path will be circular about the axis.
   (C) The electron will experience a force at 45° to the axis and hence execute a helical path.
   (D) The electron will continue to move with uniform velocity along the axis of the solenoid.
5. When a charged particle moves through a magnetic field perpendicular to its direction. Then
   (A) Linear momentum changes
   (B) kinetic energy remains constant
   (C) Both (A) and (B)
   (D) Both linear momentum and kinetic energy Varies

6. A solenoid of 1.5 metre length and 4.0 cm diameter has 10 turn per cm. A current of 5 A ampere is flowing through it. The magnetic field at axis inside the solenoid is
   (A) $2\pi \times 10^{-3}$ T
   (B) $2\pi \times 10^{-3}$ G
   (C) $2\pi \times 10^{-7}$ T
   (D) $2\pi \times 10^{-7}$ G
7. A rod of length L, along east-west direction is dropped from a height H. If B be the magnetic field due to Earth at that place and angle of dip is θ, then the magnitude of the induced e.m.f. across two ends of the rod when the rod reachs the Earth is
   (A) BLH cos θ
   (B) BL cos θ × $(2gH)^{1/2}$
   (C) BL cos θ / $(2gH)^{1/2}$
   (D) None of the above
8. A magnetic dipole moment is a vector quantity directed from:
   (A) South to North
   (B) North to South
   (C) East to West
   (D) West to East
9. A magnetic needle is kept in a non-uniform magnetic field experiences
   (A) a force as well as a torque
   (B) a torque but not a force
   (C) a force and a torque
   (D) a force but not a torque
10. Let the magnetic field on Earth be modelled by that of a point magnetic dipole at the centre of Earth. The angle of dip at a point on the geographical equator
    (A) is always zero.
    (B) is always positive
    (C) is always negative
    (D) can be positive or negative or zero.
11. Relative permeability of a magnetic material is 0.5. The material is
    (A) diamagnetic.
    (B) ferromagnetic.
    (C) paramagnetic.
    (D) not a magnetic material.

12. Which of the following is most suitable for the core of an electromagnet?
    (A) Soft iron
    (B) Steel
    (C) Alnico
    (D) Copper

Directions for question number 13 to 17

Electromagnetic damping: Take two hollow thin cylindrical pipes of equal internal diameters made of aluminium and *PVC*, respectively. Fix them vertically with clamps on retort stands. Take a small cylindrical magnet having diameter slightly smaller than the inner diameter of the pipes and drop it through each pipe in such a way that the magnet does not touch the sides of the pipes during its fall. You will observe that the magnet dropped through the *PVC* pipe takes the same time to come out of the pipe as it would take when dropped through the same height without the pipe. Now instead of *PVC* pipe use an aluminium pipe. Note the time it takes to come out of the pipe in each case. You will see that the magnet takes much longer time in the case of aluminium pipe. Why is it so ? It is due to the eddy currents that are generated in the aluminium pipe which oppose the change in magnetic flux, *i.e.*, the motion of the magnet. The retarding force due to the eddy currents inhibits the motion of the magnet. Such phenomena are referred to as electromagnetic damping. Note that eddy currents are not generated in
PVC pipe as its material is an insulator whereas aluminium is a conductor. This effect was discovered by physicist Foucault (1819-1868).

13. Eddy current is generated in a:
    (A) metallic pipe.
    (B) PVC pipe.
    (C) glass pipe.
    (D) wooden pipe.
14. Eddy current was first observed by:
    (A) Helmhotlz
    (B) Foucault
    (C) D'Arsonval
    (D) Shock ley

15. What is electromagnetic damping ?

(A) Generation of electromagnetic wave during the passage of a magnet through a metal pipe

(B) Change of the direction of propagation of electromagnetic wave due to a variable magnetic flux

(C) Change of the frequency of electromagnetic wave due to a variable magnetic flux

(D) To slow down the motion of a magnet moving through a metal pipe due to electromagnetically induced current.

16. To observe electromagnetic damping a magnet should be dropped through a metal pipe and:

(A) the magnet should not touch inner wall of the pipe.

(B) the magnet should touch the inner wall of the pipe.

(C) it does not matter whether the magnet touches the inner wall of the pipe or not.

(D) the magnet should be larger in size than the diameter of the pipe.

17. A piece of wood and a bar magnet of same dimension is dropped through an aluminium pipe. Which of the following statements is true ?

(A) The piece of wood will take more time to come out from the pipe.

(B) The bar magnet will take more time to come out from the pipe.

(C) Both will take same time to come out from the pipe.

(D) The time required will depend on the mass of the wooden piece and the mass of the bar magnet.

18. **Assertion (A):** When the magnetic flux changes around a metallic conductor, the eddy current is produced.

Reason (R): Electric potential determines the flow of charge.

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT the correct explanation of A

(C) A is true but R is false

(D) A is false and R is true

19. **Assertion (A):** If the number of turns of a coil is increased, it becomes more difficult to push a bar magnet towards the coil.

Reason (R): The difficulty faced is according to Lenz's law.

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT the correct explanation of A

(C) A is true but R is false

(D) A is false and R is true

20. An alternating current generator has an internal resistance Rg and an internal reactance Xg. It is used to supply power to a passive load consisting of a resistance Rg and a reactance XL. For maximum power to be delivered from the generator to the load, the value of XL is equal to

    (A) zero

    (B) Xg

    (C) −Xg

    (D) Rg

21. When a voltage measuring device is connected to AC mains, the meter shows the steady input voltage of 220 V. this means

    (A) input voltage cannot be AC voltage, but a DC voltage.

    (B) maximum input voltage is 220 V.

    (C) The meter reads not v but (V^2) and is calibrated to read $(\sqrt{V^2})$.

    (D) The pointer of the meter is stuck by some mechanical defect.

22. When frequency of applied alternating voltage very high then

    (A) A capacitor will tend to become SHORT

    (B) An inductor will tend to become SHORT

    (C) Both (A) and (B)

    (D) No one will become short

23. The heat produced in a given resistance in a given time by the sinusoidal current I0 sin *wt* will be the same as heat produced by a steady current of magnitude

    (A) 0.707 I_0

    (B) 1.412 I_0

    (C) I_0

    (D) $\sqrt{I_0}$

24. An A.C. source is connected to a resistive circuit. Which of the following statements is true?

    (A) Current leads the voltage in phase

    (B) Current lags the voltage in phase

    (C) Current and voltage are in same phase

    (D) Either (A) or (B) depending on the value of resistance.

25. In which of the following circuit power dissipation is maximum?

    (A) Pure capacitive circuit

    (B) Pure inductive circuit

    (C) Pure resistive circuit

    (D) LR or CR circuit