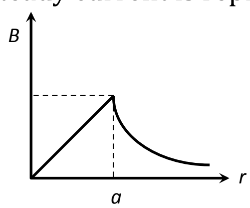
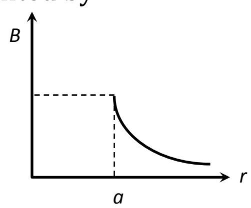
DPP
DAILY PRACTICE PROBLEMS

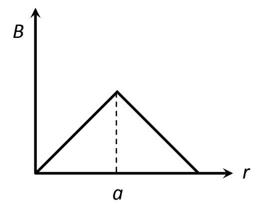
Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 10**

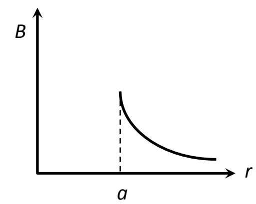
Topic :- MOVING CHARGES AND MAGNETISM

1. The magnetic field due to a straight conductor of uniform cross section of radius a and carrying a steady current is represented by

a) 

b) 

c) 

d) 

2. An electron and a proton enter region of uniform magnetic field in a direction at right angles to the field with the same kinetic energy. They describe circular paths of radius r_e and r_p respectively. Then
a) $r_e = r_P$
b) $r_e < r_P$
c) $r_e > r_P$
d) r_e may be less than or greater than r_P depending on the direction of the magnetic field

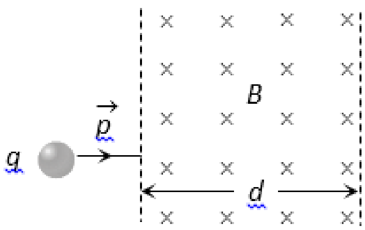
3. An α-particle with a specific charge of 2.5×10^7 C kg^{-1} moves with a speed of 2×10^5 ms^{-1} in a perpendicular magnetic field of 0.05 T. Then the radius of the circular path described by it is
a) 8 cm b) 4 cm c) 16 cm d) 2 cm

4. Graph of force per unit length between two long parallel currents carrying conductor and the distance between them is
a) Straight line b) Parabola
c) Ellipse d) Rectangular hyperbola

5. An arbitrary shaped closed coil is made of a wire of length L and a current I ampere is flowing in it. If the plane of the coil is perpendicular to magnetic field $\vec{B}$, the force on the coil is
a) Zero b) IBL c) $2IBL$ d) $\frac{1}{2}IBL$

6. A beam of protons is moving parallel to a beam of electrons. Both the beams will tend to
a) Repel each other b) Come closer c) Move more apart d) Either (b) or (c)

7. A particle with charge q, moving with a momentum p, enters a uniform magnetic field normally. The magnetic field has magnitude B and is confined to a region of width d, where $d < \frac{p}{Bq}$. If the particle is deflected by an angle θ in crossing the field, then

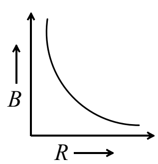


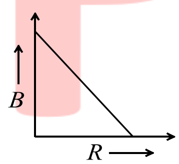
a) $\sin\theta = \frac{Bqd}{p}$ b) $\sin\theta = \frac{p}{Bqd}$ c) $\sin\theta = \frac{Bp}{qd}$ d) $\sin\theta = \frac{pd}{Bq}$

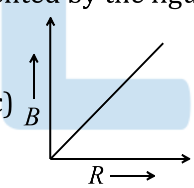
8. Magnetic induction at the centre of a circular loop of area π m^2 is 0.1 T. The magnetic moment of the loop is (μ_0 = permeability of air)

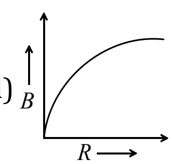
a) $\frac{0.1\pi}{\mu_0}$ b) $\frac{0.2\pi}{\mu_0}$ c) $\frac{0.3\pi}{\mu_0}$ d) $\frac{0.4\pi}{\mu_0}$

9. A charge Q is uniformly distributed over the surface of non-conducting disc of radius R. The disc rotates about an axis perpendicular to its plane and passing through its centre with an angular velocity ω. As a result of this rotation a magnetic field of induction B is obtained at the centre of the disc. If we keep both the amount of charge placed on the disc and its angular velocity to be constant and very the radius of the disc then the variation of the magnetic induction at the centre of the disc will be represented by the figure

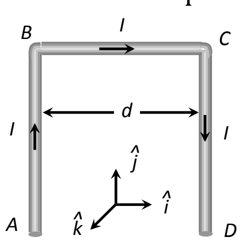
a) 

b) 

c) 

d) 

10. AB and CD are long straight conductors, distance d apart, carrying a current I. The magnetic field at the midpoint of BC is



a) $\frac{-\mu_0 I}{2\pi d}\hat{k}$ b) $\frac{-\mu_0 I}{\pi d}\hat{k}$ c) $\frac{-\mu_0 I}{4\pi d}\hat{k}$ d) $\frac{-\mu_0 I}{8\pi d}\hat{k}$

11. The expression for magnetic induction inside a solenoid of length L carrying a current I and having N number of turns is

a) $\frac{\mu_0}{4\pi}\frac{N}{LI}$ b) $\mu_0 NI$ c) $\frac{\mu_0}{4\pi} NLI$ d) $\mu_0 \frac{N}{L} I$

12. If same current I passing through two parallel wires separated by a distance b, then force per unit length will be

a) $\frac{\mu_0}{4\pi}\frac{2I^2}{b}$ b) $\frac{\mu_0 I}{4\pi b^2}$ c) $\frac{\mu_0 I^2}{4\pi b^2}$ d) $\frac{\mu_0 I^2}{4\pi b}$

13. The earth's magnetic induction at certain point is $7 \times 10^{-5}\ Wb/m^2$. This is to be annulled by the magnetic induction at the centre of a circular conducting loop of radius $5\ cm$. The required current in the loop is

a) $0.56\ A$ b) $5.6\ A$ c) $0.28\ A$ d) $2.8\ A$

14. A galvanometer of resistance 100 Ω gives a full scale deflection for a current of 10^{-5} A. To convert it into a ammeter capable of measuring upto 1A, we should connect a resistance of

a) 1 Ω in parallel b) 10^{-3} Ω in parallel c) 10^{5} Ω in series d) 100 Ω in series

15. The radius of the path of an electron moving at a speed of 3×10^{7} m/s perpendicular to a magnetic field 5×10^{-4} T is nearly

a) 15 cm b) 45 cm c) 27 cm d) 34 cm

16. Biot-Savart's law may be represented in vector form as

a) $\mathbf{dB} = \frac{\mu_0}{4\pi} i \frac{\mathbf{dl} \times \mathbf{r}}{r^3}$ b) $\mathbf{dB} = \frac{\mu_0}{4\pi} i\ \mathbf{dl} \times \mathbf{r}$ c) $\mathbf{dB} = \frac{\mu_0}{4\pi} i \frac{\mathbf{dl} \times \mathbf{r}}{r^2}$ d) $\mathbf{dB} = \frac{\mu_0}{4\pi} i \frac{\mathbf{dl} \times \mathbf{r}}{r}$

17. If a long hollow copper pipe carries a direct current, the magnetic field associated with the current will be

a) Only inside the pipe b) Only outside the pie
c) Neither inside nor outside the pipe d) Both inside and outside the pipe

18. The number of lines of force passing through a unit area placed perpendicularly to the magnetic lines of force is termed as

a) Magnetic induction b) Magnetic flux density
c) Intensity of magnetic field d) All of the above

19. A particle moving in a magnetic field increases its velocity then its radius of the circle

a) Decreases b) Increases c) Remains the same d) Becomes half

20. An alternating electric field, of frequency v, is applied across the dees (radius $= R$) of a cyclotron that is being used to accelerated protons (mass $= m$). The operating magnetic field (B) used in the cyclotron and the kinetic energy (K) of the proton beam, produced by it, are given by

a) $B = \frac{mv}{e}$ and $K = 2m\pi^2 v^2 R^2$ b) $B = \frac{2\pi mv}{e}$ and $K = m^2 \pi v R^2$
c) $B = \frac{2\pi mv}{e}$ and $K = 2m\pi^2 v^2 R^2$ d) $B = \frac{mv}{e}$ and $K = m^2 \pi v R^2$