PHYSICS

BOOKS - CENGAGE PHYSICS (HINGLISH)

Moving charges and magnetism

Question Bank

1. Two circulat coils of radii ratio 1: 2 and turn ratio 4: 1, respectively, are connected in series, The ratio of value of magnetic field at their centre is

Watch Video Solution

2. Find the radius of a circular orbit of an electron of energy 5 keV in a field of $10^{-7}T$.

Watch Video Solution

3. A toroid has a core (non-ferromagnetic) of inner racius $25^\circ cm$ and outer radius 26 cm, around which 3,500 tums ofe wire are wound. If the cument in the wire is 11 A, then what is the magpetic field (in tesla) inside the core of the toroid?

Watch Video Solution

4. In hydrogen atom, the electron is making 6.6×10^{15} rev/s around the nucleus in an orbit of radius $0.528\forall$. The magnetic moment is $x \times 10^{23} (Am)^2$. Find the value of x.

View Text Solution

5. An electric current is flowing in a circular wire of radius $10 cm$. At what distance (in cm) from the centre on the axis of the circular wire will the magnetic field be $\frac{1}{8}$ th of its value at the centre? (Take $\sqrt{2} = 1.41, \sqrt{3} = 1.73$)

Watch Video Solution

6. Five hundred turns of a wire are wound oa, a thin tubc 1m long. If the wire carries a current of 5A , determine the field (in mT) in the tube.

Watch Video Solution

7. A steady current I goes through a wire loop PQR having shape of a right angle triangle with $PQ = 3x, PR = 4x$ and $QR = 5x$. If the magnitude of the magnetic field at P due to this loop is $k\left(\frac{\mu_0 I}{48\pi x}\right)$, find the value of K.

Watch Video Solution

8. A proton is projected with a speed of 2×10^5 m/s at an angle 60° to x -axis. If a uniform magnetic field of 0.1 T is 'applied along y -axis, then the path of proton is helical with time period $a \times 10^{-5} s. (Take$pi=3.14)`

Watch Video Solution

9. An electron (mass $= 9.1 \times 10^{-31} kg$, charge $= 1.6 \times 10^{-19} C$) experiences no deflection if subjected to an electric field of $3.2\text{x}10^5 \frac{V}{m}$, and $a mag \ne tic fields of$2.0xx10^(-3)Wb/m^(2)`. Both the fields are normal to the path of electron and to each other. If the electric field is removed, then the electron will revolve in an orbit of radius

Watch Video Solution

10. A long straight solid conductor of radius $5(~cm)$ carries a current of 2 A waich is uniformly distributed over its circular cross-section. If the magnetic field induction at a distunce of 3 cm from the axis of the conductor is $y \times 10^{-6} T$, then find the value of y.

Watch Video Solution

11. A uniform magnetic ficld B ы $B_0 j$ exists in space. A particle of mass m and charge q is projected towards negative x -axis with speed v from the a point $(d, 0, 0)$. If the maximum value of v for which the particle does not hit y^{-z} plane is $\frac{4B_0qd}{\alpha m}$, then calculate α.

Watch Video Solution

12. Current $i = 2.5A$ flows along the circular coil whose equation is given by $x^2 + y^2 = 9(\text{x and y` are in cm })$. Find the magnetic field in (Tesla) at a point (0,0,4).

View Text Solution

13. An α -particle of 1 MeV energy moves in circular path in uniform magnetic field. The kinetic energy (in MeV) of proton in the same magnetic field for circular path of double radius is

Watch Video Solution

14. A particle of charge $-16 \times 10^{-19} C$ moving with velocity $10mg^{-1}$ along the x -axis ẹnters a region where magnetic field B is along the y axis and electric field of magnitude 10^4 (V/m) is along the negalive z-axis If the charged particle contintes moving along the x -axis, then the magnitude of $B\left(\frac{Wb}{(m)^2}\right)$ is

View Text Solution

15. Two moving coil galvanometers X and Y are connected in series and a current passes through them. Their readings are found to be full scale for X and half scale for Y. Given that their scales are identical and their restoring springs of same strength, but that $X's$ coil is twice as large in area and has twice the number of tums compared with Y s coils, Calculate the ratio of magnetic field strength of X 's magnet to that of Y° s magnet.

View Text Solution

16. Copper has 8.0×10^{28} conduction clectrons per metre'. A copper wire of length $1m$ and cross-sectional area $8.0 \times 10^{-5}) m^2 carry \in gacurrent$ and $ly \in gatright\angle \to amag \neq ticfiel$ 5 xx 10^(-3)$'T\exp eriencesaf$ or $ceof$8.0 xx 10^(-2) N $. Ifthedr$ if $tvelocityofeec \leq ctrons \in thewire - is$1.56 xx 10^(-n) $\frac{m}{s}, thenf \in d$n`.

View Text Solution

17. A block of mass m and charge q is released on a long, smooth inclined surface. The magnetie field B is constant, uniform, horizontal and paraillel to the surfice as shown. If the time from start when the block loses contact with the surface is $\frac{m \cot \theta}{kaB}$, then find k.

View Text Solution

18. The deflection in a moving coil galvanometer is reduced to half, when it is shunted with a resistance 40Ω. The resistance of the galvanometer is

Watch Video Solution

19. A particle of charge q and mass m starts moving from the origin with a velocity $\overrightarrow{v} \dot{e} q v_0 \hat{j}$ under the action of an electric field $\overrightarrow{E} = E_5 \bar{i}$ and magnetic field $\overrightarrow{B} = B_0 \overrightarrow{i}$ The speed of the particle will become $2v_0$ aftet a time $t = \dfrac{\sqrt{x} m w_0}{q E_0}$. Find the value of x.

Watch Video Solution

20. A particle of mass m and charge q enters a region of magnetic field (as shown) with speed v. There is a region in which the magnetic field is absent (as shown). The particleafter entering this region collides elastically with a riggid wall. The time after which the velocity of the purticle becomes anti-parallel to its initial velocity is. $\dfrac{m}{\alpha q B}(\pi + \beta)$. Find $(\alpha + \beta)$.

View Text Solution