DPP

DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : PHYSICS
DPP No. : 6

Topic :- MOVING CHARGES AND MAGNETISM

2 **(d)**

The time period of revolution of the electrion is

$$T = \frac{2\pi m}{qB} = \frac{2 \times 3.14 \times 9.0 \times 10^{-31}}{1.6 \times 10^{-19} \times 1 \times 10^{-4}}$$

$$= 3.5 \times 10^{-7}\ \text{s}$$

3 **(a)**

When a charged particle having K.E. T is subjected to a transverse uniform magnetic field, it describes a circular path in the magnetic field without any change in its speed. Thus, the K.E. of the charged particle remains T at all times

4 **(c)**

$M = NiA \Rightarrow M \propto A \Rightarrow M \propto r^2$ [As $I = 2\pi r \Rightarrow l \propto r$]

$\Rightarrow M \propto l^2$

5 **(b)**

The magnetic field at the centre of circular coil is

$$B = \frac{\mu_0 i}{2r}$$

Where, $r =$ radius of circle $= \frac{l}{2\pi}$ $\quad (\because l = 2\pi r)$

$$\therefore B = \frac{\mu_0 i}{2} \times \frac{2\pi}{l}$$

$$= \frac{\mu_0 i \pi}{l} \qquad \ldots(i)$$

When wire of length l bents into a circular loops of n turns, then

$$l = n \times 2\pi r'$$

$$\Rightarrow r' = \frac{1}{n \times 2\pi}$$

Thus, new magnetic field

$$B' = \frac{\mu_0 ni}{2r'} = \frac{\mu_0 ni}{2} \times \frac{n \times 2\pi}{l}$$

$$= \frac{\mu_0 i\pi}{l} \times n^2$$

$$= n^2 B \qquad \text{[From Eq. (i)]}$$

6 **(d)**

When charged particle enters perpendicularly in a magnetic field, it moves in a circular path with a constant speed. Hence it's kinetic energy also remains constant

7 **(a)**

$$r = \frac{mv}{qB} \Rightarrow \frac{e}{m} = \frac{v}{rB}$$

8 **(b)**

Magnitude of the magnetic moment

$$M = I\,A \begin{bmatrix} \text{where} & I & \text{is the current} \\ \text{and} & A & \text{is the area} \end{bmatrix}$$

The current produced in one revolution

$$I = ev = e\frac{2\pi}{T}$$

$\therefore$ Magnetic moment $= \frac{2\pi}{T}|e|A$

As the electron is flowing in the anticlockwise direction. The current is flowing in the clockwise direction.

$$\therefore M = -\frac{2\pi}{T}\,|e|A$$

10 **(c)**

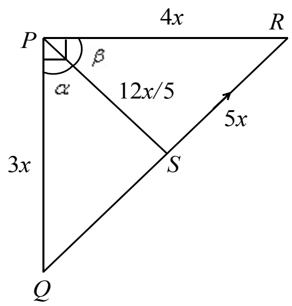
Magnetic field at P due to PQ & PR is zero

$\therefore$ Magnetic field at P due to QR

$$B = \frac{\mu_0}{4\pi} \cdot \frac{I}{PS}(\sin\alpha + \sin\beta)$$

Where, $B = \frac{\mu_0}{4\pi} \cdot \frac{1}{\frac{12x}{5}}\left[\frac{3}{5} + \frac{4}{5}\right]$

$$B = \frac{\mu_0}{4\pi} \times \frac{1}{12x} \times 7 = \frac{7\mu_0 I}{48\,\pi x} \quad \therefore k = 7$$



11 **(a)**

Using $eE = evB \Rightarrow E = vB = 5 \times 10^6 \times 0.02 = 10^5 Vm^{-1}$

13 **(b)**

Current carrying conductors will attract each other, while electron beams will repel each other

14 **(c)**

Force on the wire $= Bil$

Force per unit length $= Bi = 10^{-4} \times 10 = 10^{-3} N$

16 **(c)**

Net force on loop is zero

17 **(b)**

For charge particles, if they are moving freely in space, electrostatic force is dominant over magnetic force between them. Hence due to electric force they repel each other

18 **(b)**

$r = \sqrt{2mE} / Bq$ and $r_1 = \sqrt{2m(E/2)} / Bq$;

So, $r_1 = r/\sqrt{2}$

19 **(c)**

Here, $i_g = \frac{1}{2} i$; $S = 40\Omega$, $G = ?$

$G = (i - i_g)S/i_g = \frac{(i - i/2) \times 40}{i/2} = 40\Omega$

20 **(a)**

For wire A,

$$B_1 = \frac{\mu_0 i_1}{2r}$$

Where $r = \frac{40}{2\pi}$

For wire B,

Circumference = length

$n\pi r = 30$

or $n\pi = \frac{30}{r} = \frac{30}{40/2\pi} = \frac{3}{2}\pi$

or $\theta = n\pi = \frac{3}{2}\pi$

$\therefore \quad B_2 = \frac{\mu_0}{4\pi}\left(\frac{i_2}{r}\right)\theta$

But $B_1 = B_2$

or $\frac{\mu_0 i_1}{2r} = \frac{\mu_0}{4\pi}\left(\frac{i_2}{r}\right)\theta$ or $\frac{i_1}{i_2} = \frac{3}{4}$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	A	D	A	C	B	D	A	B	A	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	A	B	B	C	C	C	B	B	C	A