Prachand NEET (2025)

Physics

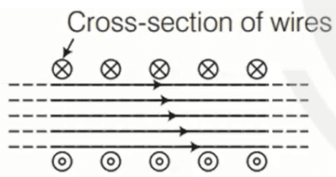
Moving Charges and Magnetism

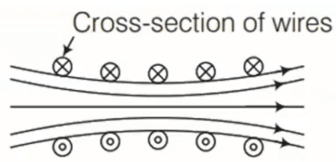
DPP : 01

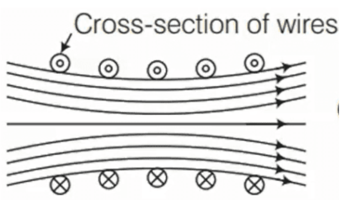
Q1 A closely wound solenoid of 2000 turns and area of cross-section $1.5 \times 10^{-4}\ \mathrm{m}^2$ carries a current of $2.0\ \mathrm{A}$. It is suspended through its centre and perpendicular to its length, allowing it to turn in a horizontal plane in a uniform magnetic field 5×10^{-2} tesla making an angle of 30° with the axis of the solenoid. The torque on the solenoid will be

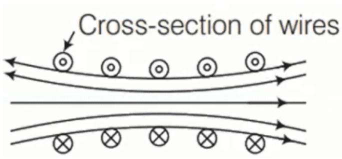
(A) $3 \times 10^{-3}\mathrm{Nm}$
(B) $1.5 \times 10^{-3}\mathrm{Nm}$
(C) $1.5 \times 10^{-2}\mathrm{Nm}$
(D) $3 \times 10^{-2}\mathrm{Nm}$

Q2 Which of the following represents a correct figure to display magnetic field lines due to a solenoid?

(A)


(B)


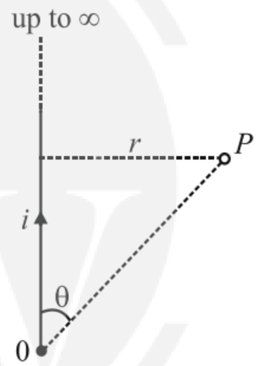
(C)


(D)


Q3 Current sensitivity of a moving coil galvanometer is $5\mathrm{div/mA}$ and its voltage sensitivity (angular deflection per unit voltage applied) is $20\mathrm{div/V}$. The resistance of the galvanometer is

(A) 40Ω
(B) 25Ω
(C) 250Ω
(D) 500Ω

Q4 A straight wire of semi-infinite length having current **i** has starting point at O as shown in figure. The magnetic field at point P will be:

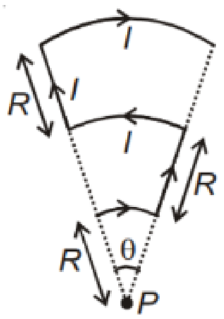


(A) $\frac{\mu_0}{4\pi}\frac{i}{r}(1+\sin\theta) inward$
(B) $\frac{\mu_0}{4\pi}\frac{i}{r}(1+\cos\theta) inward$
(C) $\frac{\mu_0}{4\pi}\frac{i}{r}(1+\sin\theta) outward$
(D) $\frac{\mu_0}{4\pi}\frac{i}{r}(1+\cos\theta) outward$

Q5 A proton and an α-particle enter in a uniform magnetic field perpendicularly with same speed. The ratio of time periods of both particles $\left(\frac{T_p}{T_\alpha}\right)$ will be

(A) $1:2$ (B) $1:3$
(C) $2:1$ (D) $3:1$

Q6 Magnetic field at P due to given structure is



(A) $\left(\frac{\mu_0}{4\pi}\right)\frac{I\theta}{2R}$
(B) $\frac{\mu_0}{4\pi}\frac{6I\theta}{5R}$
(C) $\left(\frac{\mu_0}{4\pi}\right)\frac{5I\theta}{6R}$
(D) $\left(\frac{\mu_0}{4\pi}\right)\frac{2I\theta}{R}$

Q7 Two particles X and Y having equal charges after being accelerated through the same potential difference, enter a region of uniform magnetic field and describe circular path of radius R_1 and R_2 respectively. The ratio of mass of X to that of Y is

(A) $\left(\frac{R_1}{R_2}\right)^{1/2}$
(B) $\frac{R_2}{R_1}$
(C) $\left(\frac{R_1}{R_2}\right)^2$
(D) $\frac{R_1}{R_2}$

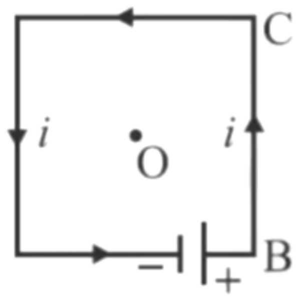
Q8 If an electron enters a magnetic field with its velocity pointing in the same direction as the magnetic field, then

(A) The electron will turn towards right
(B) The electron will turn towards left
(C) The velocity of the electron will increase
(D) The velocity of the electron will remain unchanged

Q9 Consider a tightly wound 200 turns coil of radius 5 cm, carrying a current of 4A. Find the magnitude of magnetic field at the centre of the coil.

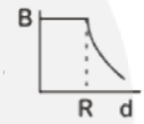
(A) $10^{-2}\,T$
(B) $10^{-3}\,T$
(C) $10^{-4}\,T$
(D) $10^{-5}\,T$

Q10 Following is square shape loop, whose one arm BC produces magnetic field B at the centre of coil. The resultant magnetic field due to all the arms will be:

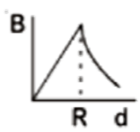


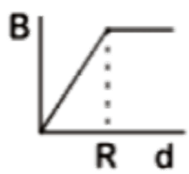
(A) $4\mathrm{B}$
(B) $\mathrm{B}/2$
(C) B
(D) $2\mathrm{B}$

Q11 A cylindrical conductor of radius R is carrying a constant current. The plot of the magnitude of the magnetic field. B with the distance d from the centre of the conductor, is correctly represented by the figure :

(A)


(B)


(C)


(D)


Q12 A resistance of 900Ω is connected in series with a galvanometer of resistance 100Ω. A potential difference of 1 volt produces 100 division deflection in the galvanometer. Find the figure of merit of galvanometer ?

(A) 10^{-6} A/div
(B) 10^{-4} A/div
(C) 10^{-7} A/div
(D) 10^{-5} A/div

Q13 Magnetic field at a distance r from an infinitely long straight conductor carrying steady current varies as

(A) $1/r^2$
(B) $1/r$
(C) $1/r^3$
(D) $1/\sqrt{r}$

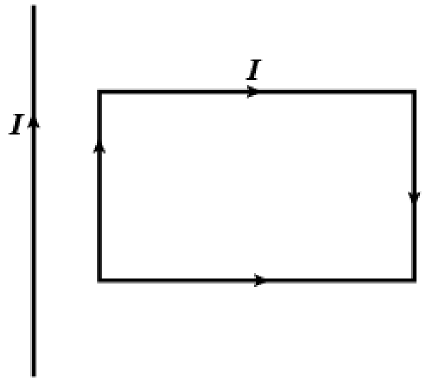
Q14 A current carrying loop is placed in a uniform magnetic field. The torque acting on it does not depend upon

(A) shape of the loop.
(B) area ot the loop.
(C) value of the current.
(D) magnetic field.

Q15 A closed curve encircles several conductors. The line integral $\int \vec{B} \cdot d\vec{l}$ around this curve is 3.83×10^{-7} T − m. What is the net current in the conductors?

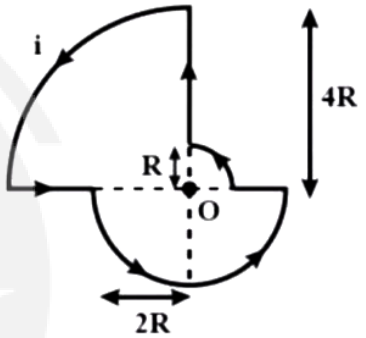
(A) 0.1 A
(B) 0.2 A
(C) 0.3 A
(D) 0.4 A

Q16 A rectangular loop carrying a current I is situated near a long straight wire such that the wire is parallel to one of the sides of the loop and is in the plane of the loop. If a steady current I is established in the wire as shown in the figure, the loop will:



(A) Rotate about an axis parallel to the wire
(B) Move away form the wire
(C) Move towards the wire
(D) Remain stationary

Q17 Find the magnetic field at the centre O of the loop shown in the figure.



(A) $\frac{\mu_o i}{32R} \odot$
(B) $\frac{9\mu_o i}{32R} \otimes$
(C) $\frac{9\mu_o i}{32R} \odot$
(D) $\frac{\mu_o i}{32R} \otimes$

Q18 A dipole of magnetic moment $\vec{M} = 30\hat{j}$ A m^2 is placed along the y-axis in a uniform magnetic field $\vec{B} = (2\hat{i} + 5\hat{j})$ T. The torque acting on it is

(A) $-40\hat{k}$ N m
(B) $-50\hat{k}$ N m
(C) $-60\hat{k}$Nm
(D) $-70\hat{k}$ N m

Q19 Calculate the value of Magnetic field $(\vec{B})$ due to a current carrying conductor at a location shown in the figure.

(A) $\vec{B} = \frac{\mu_0 i}{4\pi a}\left[\frac{\sqrt{3}}{2} - \frac{1}{\sqrt{2}}\right] \otimes$

(B) $\vec{B} = \frac{\mu_0 i}{2\pi a}\left[\frac{\sqrt{3}}{2} - \frac{1}{\sqrt{2}}\right] \odot$

(C) $\vec{B} = \frac{\mu_0 i}{4\pi a}\left[\frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}}\right] \otimes$

(D) $\vec{B} = \frac{\mu_0 i}{2\pi a}\left[\frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}}\right] \odot$

Q20 A current of $50\ \mathrm{A}$ is passed through a straight wire of length $6\ \mathrm{cm}$, then the magnetic induction at a point $5\ \mathrm{cm}$ from the either end of the wire is $(1\text{ gauss} = 10^{-4}\ \mathrm{T})$

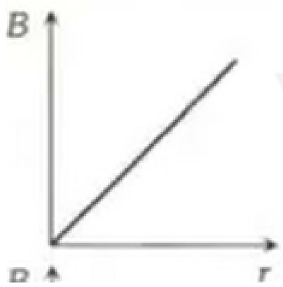
(A) 2.5 gauss

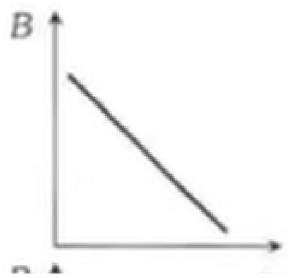
(B) 1.25 gauss

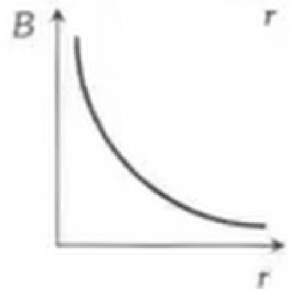
(C) 1.5 gauss

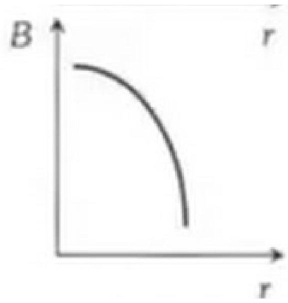
(D) 3.0 gauss

Q21 Which of the following graphs shows the variation of magnetic induction B with distance r from a long wire carrying current

(A)


(B)


(C)


(D)


Q22 An electron and a proton moving on a straight parallel paths with same velocity enter a semi-infinite region of uniform magnetic field perpendicular to velocity.

Which of these are correct?

I. They will never come out of magnetic field region.

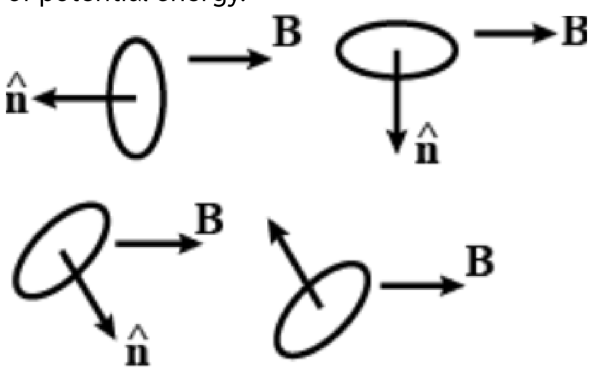
II. They will come out travelling along parallel paths.

III. They will come out same time.

IV. They will come out at different times.

(A) I and II
(B) II and III
(C) II and IV
(D) I and IV

Q23 A current carrying loop is placed in a uniform magnetic field in four different orientations, I, II, III and IV. Arrange them in the decreasing order of potential energy.

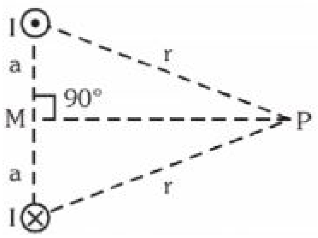


(A) I $>$ III $>$ II $>$ IV

(B) I $>$ II $>$ III $>$ IV

(C) I > IV > II > III
(D) III > IV > I > II

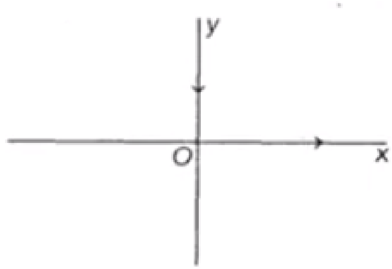
Q24 Magnetic field at point 'P' due to following current distribution is :-



(A) $\frac{\mu_0 I}{\pi r^2}\sqrt{r^2-a^2}$
(B) $\frac{\mu_0 I a}{\pi r^2}$
(C) $\frac{\mu_0 I}{2\pi r^2}\sqrt{r^2-a^2}$
(D) $\frac{\mu_0 I a}{2\pi r^2}$

Q25 For Question two statements are given, one labelled Assertion (A) and the other labelled Reason (R).
Select the correct answer to these questions from the codes $(A), (B), (C)$ and (D) as given below :
Assertion (A) Resistance of ammeter is more than that of milliammeter.
Reason (R) The current measuring range is more in ammeter than in milliammeter.
(A) Both, A and R are true and R is correct explanation of A.
(B) Both, A and R are true, but R is not a correct explanation of A.
(C) A is true, but R is false.
(D) A is false and R is true.

Q26 Equal currents are flowing in two infinitely long wires lying along x and y-axes in the directions shown in figure. Match the following two columns.



Column I	Column II
(a) Magnetic field at (a, a)	(p) along positive y-axis
(b) Magnetic field at $(-a, -a)$	(q) along positive z-axis
(c) Magnetic field at $(a, -a)$	(r) along negative z-axis
(d) Magnetic field at $(-a, a)$	(s) zero

(A) $a-q,\ b-r,\ c-s,\ d-s$
(B) $a-q,\ b-p,\ c-s,\ d-s$
(C) $a-p,\ b-r,\ c-s,\ d-s$
(D) $a-p,\ b-r,\ c-s,\ d-p$

Q27 A current flows along the length of a long thin cylindrical shell of radius R. Match the fields in different regions given in column-I to their respective matches in column-II.

Column-I		Column-II	
A.	$B(r<R)$	P.	$B \propto \frac{1}{r}$
B.	$B(r>R)$	Q.	Zero
C.	$B(r=R)$	R.	$B \propto r$
D.	$B(r=0)$	S.	Maximum
		T.	Discontinuous

(A) A - Q B - P C - S, T D - Q
(B) A - Q B - P, R C - S, T D - Q
(C) A - Q B - P C - S, T D - R
(D) A - Q B - P C - S, T D - Q, R

Q28 For Question given, one labelled Assertion (A) and the other labelled Reason (R).
Assertion(A) Ammeter is used in series and voltmeter in parallel of the circuit.
Reason (R) Ammeter is used to measure the current and voltmeter is used to measure the potential difference.
(A) Both, A and R are true and R is correct explanation of A.
(B)

Both, A and R are true, but R is not a correct explanation of A.

(C) A is true, but R is false.

(D) A is false and R is true.

Q29 **Assertion A:** The magnetic field produced by a current carrying solenoid having number of turns per unit length constant is independent of its length and cross-sectional area.

Reason R: The magnetic field inside the long solenoid is uniform.

(A) Assertion is True, Reason is True; Reason is a correct explanation for Assertion

(B) Assertion is True, Reason is True, Reason is not a correct explanation for Assertion

(C) Assertion is True, Reason is False

(D) Assertion is False but, Reason is True

Q30 **Statement I**: If a charged particle is moving on a circular path in a perpendicular magnetic field, the momentum of the particle does not change.

Statement II: Velocity of charge particle does not change in the magnetic field.

(A) Both statements are true and statement II is the correct explanation of statement I.

(B) Both statements are true but statement II is not the correct explanation of statement I.

(C) Statement I is true but statement II is false.

(D) Both statements are false.

Answer Key

Q1	(C)
Q2	(C)
Q3	(C)
Q4	(B)
Q5	(A)
Q6	(C)
Q7	(C)
Q8	(D)
Q9	(A)
Q10	(A)
Q11	(C)
Q12	(D)
Q13	(B)
Q14	(A)
Q15	(C)
Q16	(C)
Q17	(C)
Q18	(C)
Q19	(A)
Q20	(C)
Q21	(C)
Q22	(C)
Q23	(C)
Q24	(B)
Q25	(D)
Q26	(A)
Q27	(A)
Q28	(A)
Q29	(B)
Q30	(D)

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

(C)

$\tau = Ni\ A\ B\ \sin\theta$

Video Solution:

Q2 Text Solution:

(C)

From right hand thumb rule, we can say that option C is the correct answer.

Video Solution:

Q3 Text Solution:

(C)

Current sensitivity, $I_s = 5\frac{div}{mA}$

Voltage sensitivity, $V_s = 20\frac{div}{V}$

$V_s = \frac{I_s}{R}$

$R = 250\ \Omega$

Video Solution:

Q4 Text Solution:

(B)

$B = \frac{\mu_0}{4\pi}\frac{i}{r}\left[\cos\theta_1 + \cos\theta_2\right],\ \theta_1 = \theta^\circ,\ \theta_2 = 0^\circ$

Video Solution:

Q5 Text Solution:

(A)

By using

$T = \frac{2\pi m}{qB}$

$\Rightarrow \frac{T_\alpha}{T_p} = \frac{m_\alpha}{m_p} \times \frac{q_p}{q_\alpha} = \frac{4m_p}{m_p} \times \frac{q_p}{2q_p}$

$\Rightarrow T_\alpha = 2T_p$

Video Solution:

Q6 Text Solution:

(C)

$\vec{B}_p = \frac{\mu_0 I\,\theta}{4\pi R} + \frac{\mu_0 I\,\theta}{4\pi(3R)} - \frac{\mu_0 I\,\theta}{4\pi(2R)}$

$\vec{B}_p = \frac{\mu_0\ I\,\theta}{4\pi R}\left[1 + \frac{1}{3} - \frac{1}{2}\right] = \frac{5}{6}\frac{\mu_0\ I\,\theta}{4\pi R}$

Video Solution:

Q7 Text Solution:

(C)

$r=\frac{mV}{Bq}$

$K=\frac{1}{2}mv^2=eV$

$r=\frac{\sqrt{m^2V^2}}{Bq}=\frac{\sqrt{2mK}}{Bq}$

$\Rightarrow m\ \alpha\ V^2$

$\frac{m_1}{m_2}=\left[\frac{r_1}{r_2}\right]^2$

Video Solution:

Q8 Text Solution:

(D)

If an electron's velocity matches the direction of the field, then

$\theta=0^0$

we know that force in magnetic field is,

$F=qvB\sin\theta$

As $\theta=0^0$

then F=0;

Consequently, an electron's velocity will not change.

Video Solution:

Q9 Text Solution:

(A)

Since coil is tightly wound, we may take each circular element to have same radius

$R=5\ cm=5\times10^{-2}m$

N = 200

I = 4A

$B=\frac{\mu_0 NI}{2R}=\frac{4\pi\times10^{-7}\times200\times4}{2\times5\times10^{-2}}$

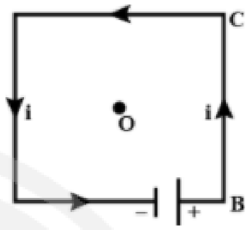
$=100.48\times10^{-4}$T

$\approx10^{-2}$T

Video Solution:

Q10 Text Solution:

(A)



The direction of flow of current in the given square loop is anti-clockwise .

Thus, according to the right-hand rule, the magnetic field due to any of the arms will be in the direction outside the plane of paper.

So, the net magnetic field will be an addition of magnetic fields of all arms.

The magnetic field of arm BC is given as B.

It's a square loop so all the arms will have the same magnetic field i.e.B

By adding all the magnetic fields we will get the resultant magnetic field due to all the form arms.

Therefore, the magnetic field because of all the four arms at the center will be,

$\mathrm{B_{net}}=\mathrm{B}+\mathrm{B}+\mathrm{B}+\mathrm{B}$

$\Rightarrow\mathrm{B_{net}}=4\mathrm{B}$

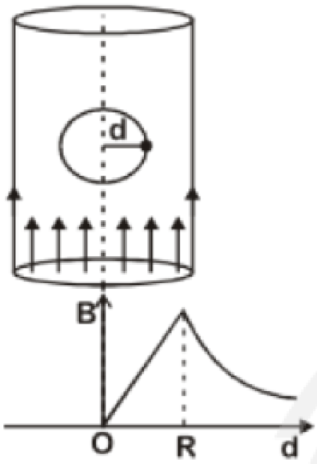
Thus, the net magnetic field due to all the arms is $4\mathrm{B}$

Hence option(1) is the correct answer.

Video Solution:

Q11 Text Solution:

(C)



Inside (d < R)

Magnetic field inside conductor

$B = \frac{\mu 0}{2\pi} \frac{i}{R^2} d$

$or\ B = \ Kd... \left(i\right)$

Straight line passing through origin

At surface (d = R)

$B = \frac{\mu_0}{2\pi} \frac{i}{R} .... \left(ii\right)$

Maximum at surface

Outside (d > R)

$B = \frac{\mu_0}{2\pi} \frac{i}{d}$

$or\ B \propto \frac{1}{d} \left(Hyperbolic\right)$

Video Solution:

Q12 Text Solution:

(D)

Solution:

$K = \frac{I}{\theta} = \frac{V}{R\theta}$

$K = \frac{1}{(900+100)100} = \frac{1}{10^5}$

$K = 10^{-5} A/$ division

Video Solution:

Q13 Text Solution:

(B)

Magnetic field at a distance r from infinetly long wire is given by

$B = \frac{\mu_0\ i}{2\pi r} \quad \Longrightarrow \quad B \propto \frac{1}{r}$

Video Solution:

Q14 Text Solution:

(A)

Torque acting on a current carrying loop is given by

$\overrightarrow{\tau} = NiAB \sin\theta$

Clearly, torque doesnot depend upon the shape of loop.

Video Solution:

Q15 Text Solution:

(C)

From Ampere's law ,for a closed loop carrying current

$$\int \vec{B} \cdot \vec{dl} = \mu_0 i$$

i = $\frac{\int \vec{B} \cdot \vec{dl}}{\mu_0}$

since $\mu_0 = 4\pi \times 10^{-7} \ H/m.$ and

$$\int \vec{B} \cdot \vec{dl} = 3.83 \times 10^{-7}$$

given

i= $\frac{3.83 \times 10^{-7}}{4\pi \times 10^{-7}} = 0.3A$

Video Solution:

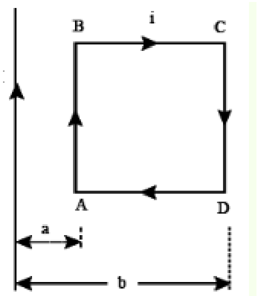
Q16 Text Solution:

(C)

The correct option is **C**

move towards the wire

Referring to Fig. the forces acting on arms BC and AD are equal and opposite. The force on arm AB is given by-



$\frac{F_1}{L} = \frac{\mu_0 I i}{2\pi a}$

which is directed towards the wire. The force on arm CD is given by

$\frac{F_2}{L} = \frac{\mu_0 I i}{2\pi(a+b)}$

Which is directed away from the wire. Since F1>F2, the loop will move towards the wire.

Hence the correct choice is (c).

Video Solution:

Q17 Text Solution:

(C)

The correct option is C $\frac{9\mu_o i}{32R}$

Let the magnetic field at point O due to part 1, 2 and 3 be B_1, B_2 and B_3 respectively.

dB = $\frac{\mu o I dl}{4\pi r^2}$

B_1 = $\frac{\mu_o I dI}{4\pi r^2}$

B_1 = $\frac{\mu o\left(\frac{\pi 4R}{2}\right)}{4\pi(4R)^2} = \frac{\mu_o i(2\pi R)}{4\pi \times 16R^2}$

B_1 = $\frac{\mu_o}{32R}$ $\rightarrow$Out of the plane

B_2 = $\frac{\mu_o i(\pi(2R))}{4\pi(2R)^2}$

B_2 = $\frac{\mu_o i(2\pi R)}{4\pi \times 2R^2}$

B_2 = $\frac{\mu_o i}{8R}$ $\rightarrow$Out of the plane

B_3 = $\frac{\mu_o\left(\frac{\pi R}{2}\right)}{4\pi R^2}$

B_3 = $\frac{\mu_o i \pi R}{8\pi R^2}$

B_3 = $\frac{\mu_o i}{8R}$ $\rightarrow$Out of the plane

So, the net magnetic field at piont O is given by

B = B_1 + B_2 + B_3

$= \frac{\mu_o i}{32R} + \frac{\mu_o i}{8R} + \frac{\mu_o i}{8R}$

$\frac{\mu_o i}{8R}\left[\frac{1}{4} + 1 + 1\right]$

$$= \frac{\mu_o i}{sR}\left[\frac{1}{4} + 2\right] = \frac{\mu_o}{8R}\left[\frac{9}{4}\right]$$

$$B = \frac{\mu_o i}{8R}\left[\frac{9}{4}\right] \Rightarrow \frac{9\mu_o i}{32R}$$

$B = \frac{9\mu_o i}{32R}$ $\rightarrow$Out of the plane

Video Solution:

Q18 Text Solution:

(C)

Given that,

Magnetic moment of a dipole, $\overrightarrow{M} = 30\hat{j}\ Am^2$

Magnetic field, $\overrightarrow{B} = \left(2\hat{i} + 5\hat{j}\right)\ T$

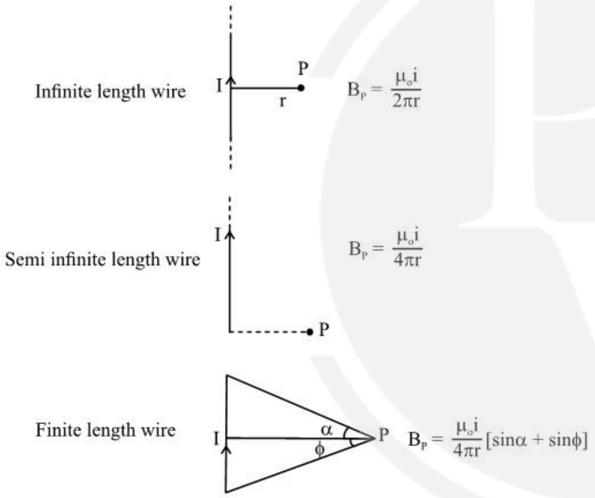
Torque acting on the dipole,

$\Rightarrow \overrightarrow{\tau} = 30\hat{j}\ \times\ \left(2\hat{i} + 5\hat{j}\right) = -60\hat{k}\ Nm$

Video Solution:

Q19 Text Solution:

(A)



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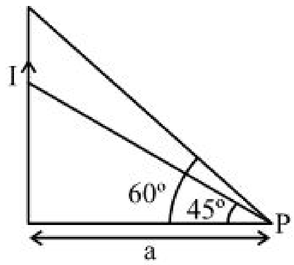


$B = \frac{\mu_o i}{4\pi a}\left[sin60^\circ - \sin 45^\circ\right]$

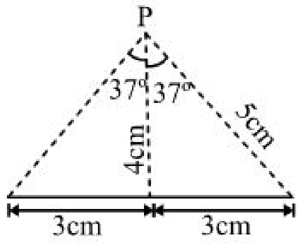
(By right hand rule we can find direction)

$B = \frac{\mu_o i}{4\pi a}\left[\frac{\sqrt{3}}{2} - \frac{1}{\sqrt{2}}\right]\otimes$

Video Solution:

Q20 Text Solution:

(C)



Electric current flowing through the straight conductor, $i = 50\ A$. Length of the wire, $L = 6\ cm$ Distance of point (p) from the centre of the wire, r = 4 cm = 0.4 m 1 gauss = $10^{-4}\ T$

Angle beteen the point P and the one end of the wire, $\theta_1 = 37^\circ$ Angle between the point P and the other end of the wire, $\theta_2 = 37^\circ$. Magnetic permeability, $\mu_o = 4\pi \times 10^{-7}$

Step 2: Formula used

B = $\frac{\mu_o i}{4\pi r}\left(\sin\theta_1 + \sin\theta_2\right)$.......................(a)

B denotes the magentic induction at the piont P

Step 3: Calculation of the magnetic induction at point P

Substituting the given values in equation (a), we get

$B = \frac{4\pi\times10^{-7}\times50A}{4\pi\times0.04\ m}\left(\sin 37^\circ + \sin 37^\circ\right)$

$B = \frac{10^{-7}\times50}{0.04}\left(0.6 + 0.6\right)$

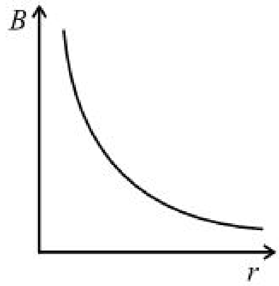
$B = 1.5 \times 10^{-4}T$

$B = 1.5\ guass$

Video Solution:

Q21 Text Solution:

(C)

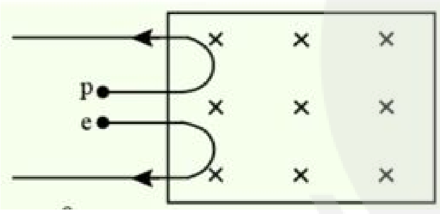


$\left|\vec{B}\right| = \frac{\mu_o}{4\pi} \cdot \frac{2\pi i}{r} \Rightarrow \left|\vec{B}\right| \propto \frac{1}{r}$

Video Solution:

Q22 Text Solution:

(C)



$\frac{mv^2}{r} = qvB$

$\Rightarrow r = \frac{mv}{qB}$

$m_e < m_p$

$\Rightarrow r_e < r_p$

$\Rightarrow t_e < t_p$

Video Solution:

Q23 Text Solution:

(C)

Potential energy, U = $-\overline{M} \cdot \overline{B} = -M\ B\cos\theta$

(1) U = $-$M Bcos180° = M B

(2) U = $-$M Bcos90° = 0

(3) U = $-$M Bcosθ

(4) Y = + M Bcosθ

Video Solution:

Q24 Text Solution:

(B)

$\left|\vec{B}_1\right| = \left|\vec{B}_2\right| = \frac{\mu_o I}{4\pi R} \times 2$

$= \frac{\mu_o I}{2\pi R} = \frac{\mu_o I}{2\pi r}$

Angle between $\vec{B}_1\ and\ \vec{B}_2 = 180 - 2\theta$

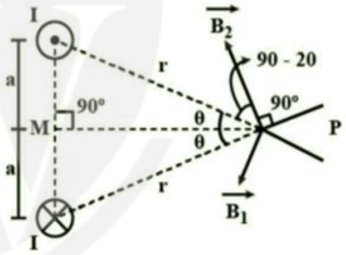
$\Rightarrow$Bnet = $\sqrt{B_1^2 + B_2^2 + 2B_1B_2\ \cos(180 - 2\theta)}$

$= \frac{\mu_0 I}{2\pi r}\sqrt{2} \times \sqrt{1 - \cos(2\theta)}$

$= \frac{\mu_0 I}{\sqrt{2}\pi r}\sqrt{2}\sqrt{\sin^2(\theta)}$

$\Rightarrow B_{net} = \frac{\mu_0 I}{\pi r} \times \frac{a}{r} = \frac{\mu_0 Ia}{\pi r^2}$

Therefore option B is correct.



Video Solution:

Q25 Text Solution:

(D)

$I_{ammeter} > I_{mA}$

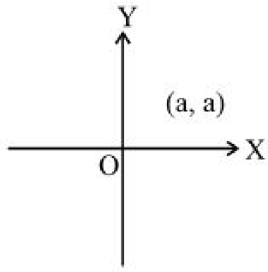
So, $R_{ammeter} < R_{mA}$

hence (A) is false and (R) is true.

Video Solution:

Q26 Text Solution:

(A)



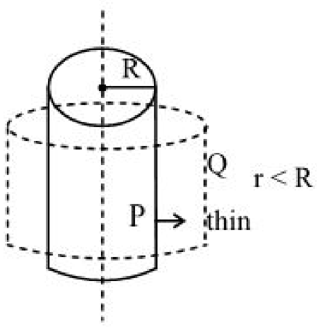
B = $\frac{\mu_0 I}{2\pi r}$

and then using Right hand rule.

Video Solution:

Q27 Text Solution:

(A)



$A)\ B_{inside} = 0$

$\downarrow$

Q

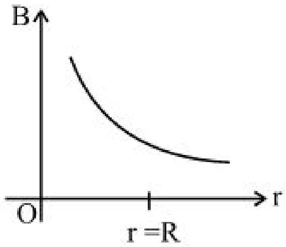
$B)\ \oint \vec{B}.\vec{dl} = \mu_0 I$

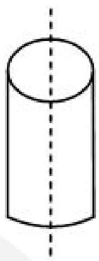
$\downarrow \quad B.2\pi r = \mu_0 I$

$P)$

B = $\frac{\mu_0 I}{2\pi r} \Rightarrow B \propto \frac{1}{r}$

(C) B = $\frac{\mu_0 I}{2\pi R}$





(D)

$B_{centre} = 0$

Video Solution:

Q28 Text Solution:

(A)

- The assertion states that "An ammeter is always connected in series whereas a voltmeter is connected in parallel."
- This is true. An ammeter measures the current flowing through a circuit, and to do this accurately, it must be connected in series with the circuit. A voltmeter measures the potential difference (voltage) across two points in a circuit, and it must be connected in parallel to measure this difference accurately.

Reason is also true and correct explanation of assertion.

Video Solution:

Q29 Text Solution:

(B)

Magnetic field inside the solenoid at point P is given by,

$B=\frac{\mu_0}{4\pi}(2\pi ni)\left[\sin\ \alpha+\sin\ \beta\right]$

Where n=no. of turns per unit length = N/L Thus it is clear that magnetic field is independent of length and cross sectional area. Also the magnetic field within solenoid is uniform and parallel to the axis of the solenoid.

Video Solution:

Q30 Text Solution:

(D)

When a charged particle is moving on a circular path in a magnetic field, the magnitude of velocity does not change but direction of velocity is changing every moment. Hence velocity is changing, so momentum (*mv*) is also changing.

Video Solution: