1. A circular current carrying coil has a radius R. The distance from the centre of the coil on the axis where the magnetic induction will be $\frac{1}{8}th$ to its value at the centre of the coil, is

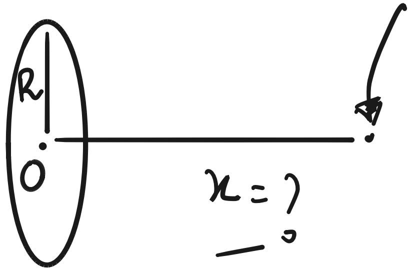
[MP PMT 1997]

(a) $\frac{R}{\sqrt{3}}$ (b) $R\sqrt{3}$

(c) $2\sqrt{3}\,R$ (d) $\frac{2}{\sqrt{3}}R$

$$B_{centre} = \frac{\mu_0 i}{2R}$$

$$\frac{B_{centre}}{8}$$



$$B = \frac{\mu_0}{2\cancel{4\pi}} \frac{\cancel{2\pi} R^2 i}{(R^2+x^2)^{3/2}}$$

$$B = \frac{\mu_0 i R^2}{2(R^2+x^2)^{3/2}}$$

$$\frac{\cancel{\mu_0 i} R^2}{\cancel{2}(R^2+x^2)^{3/2}} = \frac{1}{8}\left(\frac{\cancel{\mu_0 i}}{\cancel{2}R}\right)$$

$$8R^3 = (R^2+x^2)^{3/2}$$

$$(2R)^{\cancel{3}} = \left(\sqrt{R^2+x^2}\right)^{\cancel{3}}$$

$$2R = \sqrt{R^2+x^2}$$

$$4R^2 = R^2+x^2$$

$$x = \sqrt{3}R$$

2. The field normal to the plane of a wire of n turns and radius r which carries a current i is measured on the axis of the coil at a small distance h from the centre of the coil. This is smaller than the field at the centre by the fraction

(a) $\frac{3}{2}\frac{h^2}{r^2}$ (b) $\frac{2}{3}\frac{h^2}{r^2}$

(c) $\frac{3}{2}\frac{r^2}{h^2}$ (d) $\frac{2}{3}\frac{r^2}{h^2}$

$$B_{axial} = \frac{\mu_0 i R^2}{2(R^2+h^2)^{3/2}}$$

$(R^2)^{3/2}$

$h << R$

$$\frac{\frac{\mu_0 i}{2R} - \frac{\mu_0 i}{2R}\times\frac{3}{2}\frac{h^2}{R^2} - \frac{\mu_0 i}{2R}}{\frac{\mu_0 i}{2R}}$$

$$\text{Fraction} = \frac{B_{axial} - B_{centre}}{B_{centre}}$$

$$-\frac{3}{2}\frac{h^2}{R^2}$$

$$B_{centre} = \frac{\mu_0 i}{2R}$$

$$= \frac{\frac{\mu_0 i R^2}{2(R^2+h^2)^{3/2}} - \frac{\mu_0 i}{2R}}{\frac{\mu_0 i}{2R}}$$

$$\frac{\mu_0 i R^2}{2R^3\left(1+\frac{h^2}{R^2}\right)^{3/2}}$$

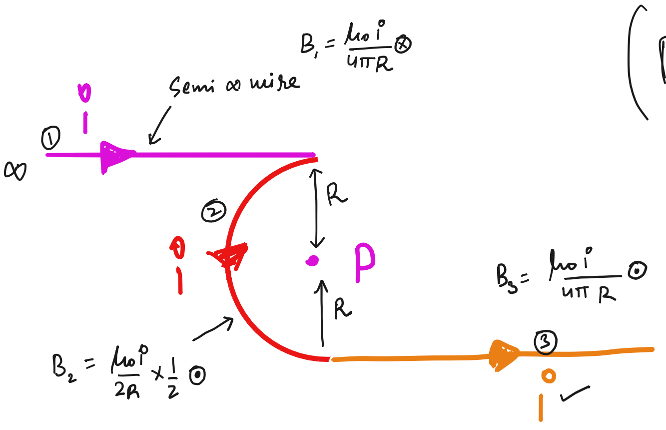
$$(1+x)^n \cong 1 + nx$$

$$x<<1$$

$$\frac{\mu_0 i}{2R}\left(1+\frac{h^2}{R^2}\right)^{-3/2}$$

$$\frac{\mu_0 i}{2R}\left(1-\frac{3}{2}\frac{h^2}{R^2}\right) = \frac{\mu_0 i}{2R} - \frac{\mu_0 i}{2R}\times\frac{3}{2}\frac{h^2}{R^2}$$

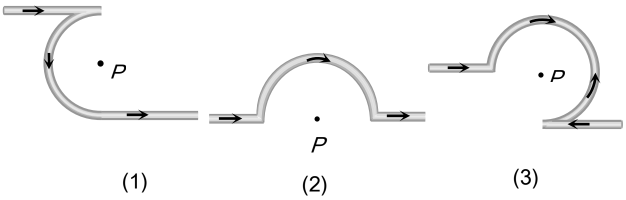
B_{axial}.

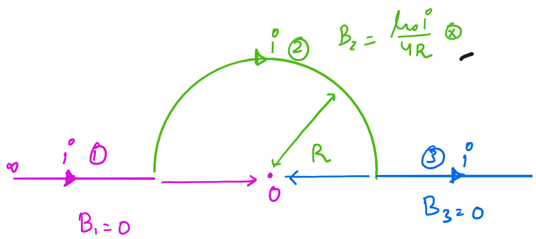


$$(B_{Net})_P = +\frac{\mu_0 i}{4R} - \cancel{\frac{\mu_0 i}{4\pi R}} + \cancel{\frac{\mu_0 i}{4\pi R}}$$

$$(B_{Net})_P = +\frac{\mu_0 i}{4R} \odot \text{ — } (A)$$

3. The magnetic field at the centre of a circular coil of radius r is π times that due to a long straight wire at a distance r from it, for equal currents. Figure here shows three cases : in all cases the circular part has radius r and straight ones are infinitely long. For same current the B field at the centre P in cases 1, 2, 3 have the ratio **[CPMT 1989]**



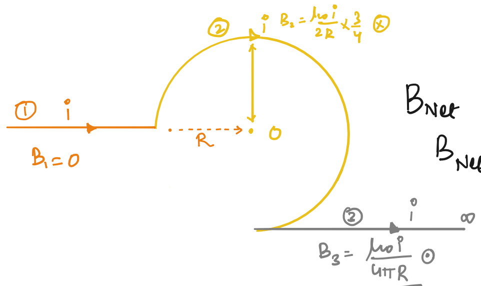


(a) $\left(-\frac{\pi}{2}\right):\left(\frac{\pi}{2}\right):\left(\frac{3\pi}{4}-\frac{1}{2}\right)$

(b) $\left(-\frac{\pi}{2}+1\right):\left(\frac{\pi}{2}+1\right):\left(\frac{3\pi}{4}+\frac{1}{2}\right)$

(c) $-\frac{\pi}{2}:\frac{\pi}{2}:3\frac{\pi}{4}$

(d) $\left(-\frac{\pi}{2}-1\right):\left(\frac{\pi}{2}-\frac{1}{4}\right):\left(\frac{3\pi}{4}+\frac{1}{2}\right)$



$$B_{Net} = B_2 - B_3$$

$$B_{Net} = \frac{\mu_0 i}{R}\left[\frac{3}{8} - \frac{1}{4\pi}\right] \otimes$$

$$B_{Net} = \frac{\mu_0 i}{4R}\left[\frac{3}{2} - \frac{1}{\pi}\right] \otimes$$

$$+\cancel{\frac{\mu_0 i}{4R}} : -\cancel{\frac{\mu_0 i}{4R}} : -\cancel{\frac{\mu_0 i}{4R}}\left(\frac{3}{2} - \frac{1}{\pi}\right)$$

$$+1 : -1 : -\left(\frac{3}{2} - \frac{1}{\pi}\right)$$

$$-1 : 1 : \frac{3}{2} - \frac{1}{\pi}$$

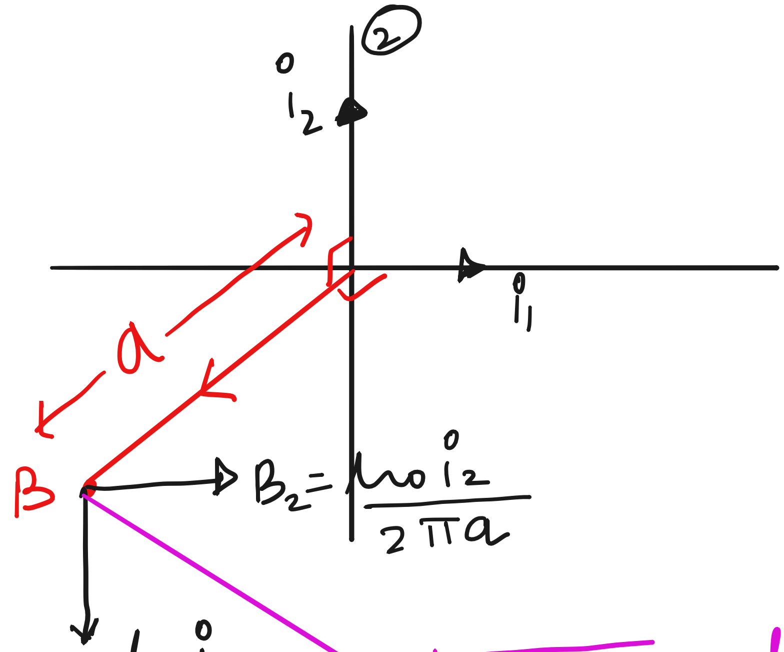
$$-\frac{\pi}{2} : \frac{\pi}{2} : \left(\frac{3\pi}{4} - \frac{1}{2}\right)$$

4. Two straight long conductors AOB and COD are perpendicular to each other and carry currents i_1 and i_2. The magnitude of the magnetic induction at a point P at a distance a from the point O in a direction perpendicular to the plane $ACBD$ is

[MP PMT 1994]

(a) $\frac{\mu_0}{2\pi a}(i_1+i_2)$ (b) $\frac{\mu_0}{2\pi a}(i_1-i_2)$

(c) $\frac{\mu_0}{2\pi a}(i_1^2+i_2^2)^{1/2}$ (d) $\frac{\mu_0}{2\pi a}\frac{i_1 i_2}{(i_1+i_2)}$



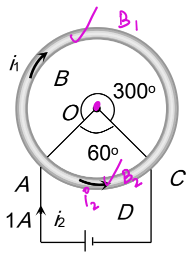
$B_2 = \frac{\mu_0 i_2}{2\pi a}$

$B_1 = \frac{\mu_0 i_1}{2\pi a}$

$\sqrt{B_1^2+B_2^2} = \frac{\mu_0}{2\pi a}(i_1^2+i_2^2)^{1/2}$

5. A cell is connected between the points *A* and *C* of a circular conductor *ABCD* of centre *O* with angle $AOC = 60^o$. If B_1 and B_2 are the magnitudes of the magnetic fields at *O* due to the currents in *ABC* and *ADC* respectively, the ratio $\frac{B_1}{B_2}$ is

[KCET 1999; Pb PET 2000]



$B_{centre} = 0$

$B_1 + B_2 = 0$

$B_1 = -B_2$

(a) 0.2

(b) 6

(c) 1

(d) 5

$\frac{B_1}{B_2} = -1$

6. An infinitely long conductor *PQR* is bent to form a right angle as shown. A current *I* flows through *PQR* The magnetic field due to this current at the point *M* is H_1. Now another infinitely long straight conductor *QS* is connected at *Q* so that the current is *I*/2 in *QR* as well as in *QS, The current in PQ* remaining unchanged. The magnetic field at *M* is now $H_{2.}$ The ratio H_1/H_2 is given by

Case - 1
at M $B_{Net} = \frac{\mu_0 i}{4\pi a} \leftarrow H_1$ — (A)

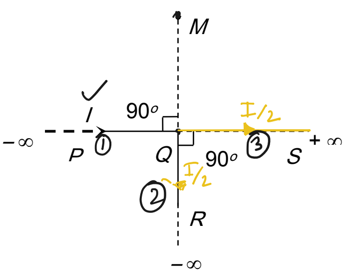
[IIT-JEE (Screening) 2000]

(a) $\frac{1}{2}$

(b) 1

(c) $\frac{2}{3}$ ✓

(d) 2



B_{Net}
↓
$H_2 = \frac{\mu_0 i}{4\pi a} + 0 + \frac{\mu_0 i/2}{4\pi a}$

$H_2 = \frac{\mu_0 i}{4\pi a} \times \frac{3}{2}$ — (B)

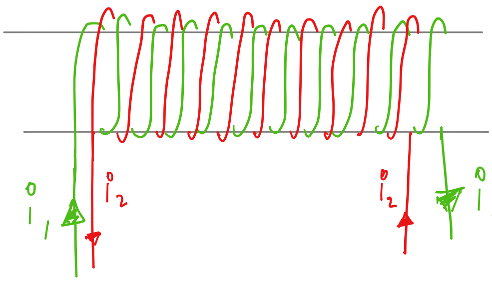
7. Two coaxial solenoids 1 and 2 of the same length are set so that one is inside the other. The number of turns per unit length are n_1 and n_2. The currents i_1 and i_2 are flowing in opposite directions. The magnetic field inside the inner coil is zero. This is possible when **[Roorkee 2000]**

(a) $i_1 \neq i_2$ and $n_1 = n_2$

(b) $i_1 = i_2$ and $n_1 \neq n_2$

(c) $i_1 = i_2$ and $n_1 = n_2$

(d) $i_1 n_1 = i_2 n_2$



$$\cancel{\mu_0} n_1 i_1 = \cancel{\mu_0} n_2 i_2$$

if $i_1 = i_2 = i$ (c)

$n_1 \cancel{i} = n_2 \cancel{i}$

$n_1 = n_2$

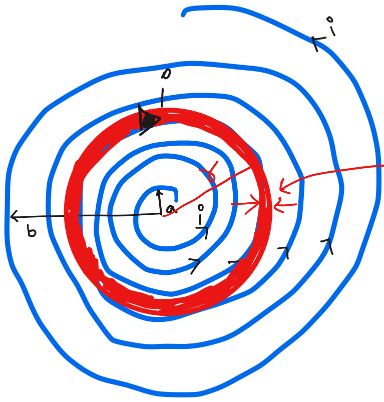
8. A coil having N turns is wound tightly in the form of a spiral with inner and outer radii a and b respectively. When a current I passes through the coil, the magnetic field at the centre is [IIT-JEE (Screening) 2001]

(a) $\frac{\mu_0 NI}{b}$ (b) $\frac{2\mu_0 NI}{a}$

(c) $\frac{\mu_0 NI}{2(b-a)}\ln\frac{b}{a}$ (d) $\frac{\mu_0 I^N}{2(b-a)}\ln\frac{b}{a}$

total turns N

consider a coil of radius $r, a<r<b$



suppose dr width has dN No. of turns.

$dB = \frac{\mu_0 i}{2r} dN$

total No. of turns in b-a length = N

In unit length No. of turns = $\frac{N}{b-a}$

No. of turns in dr length

$dN = \frac{N\,dr}{b-a}$

$$dB = \int_a^b \frac{\mu_0 i}{2r}\frac{N\,dr}{b-a} = \frac{\mu_0 i N}{2(b-a)}\left[\log r\right]_a^b$$

$$= \frac{\mu_0 i}{2(b-a)}(\log b - \log a)$$

$$= \frac{\mu_0 i}{2(b-a)}\log b/a$$

9. H^+, He^+ and O^{++} ions having same kinetic energy pass through a region of space filled with uniform magnetic field B directed perpendicular to the velocity of ions. The masses of the ions H^+, He^+ and O^{++} are respectively in the ratio $1:4:16$. As a result

(a) H^+ ions will be deflected most
(b) O^{++} ions will be deflected least
(c) He^+ and O^{++} ions will suffer same deflection
(d) All ions will suffer the same deflection

$P = mV$, $KE = \frac{P^2}{2m}$, $P = \sqrt{2mKE}$

Hint $r = \frac{mV}{qB} = \frac{\sqrt{2mKE}}{qB}$ if KE is same.

$r = \frac{\sqrt{2mKE}}{qB}$, $r \propto \frac{\sqrt{m}}{q}$

$r_{H^+} \propto \frac{\sqrt{m}}{e}$ — (A) $r_{He^+} \propto \frac{\sqrt{4m}}{e} \propto 2\frac{\sqrt{m}}{e}$

$r_{He^+} = r_{H^+} \times 2$

$r_{O^{++}} \propto \frac{\sqrt{16m}}{2e} \propto 2\frac{\sqrt{m}}{e}$

10. An ionized gas contains both positive and negative ions. If it is subjected simultaneously to an electric field along the $+x$ direction and a magnetic field along the $+z$ direction, then

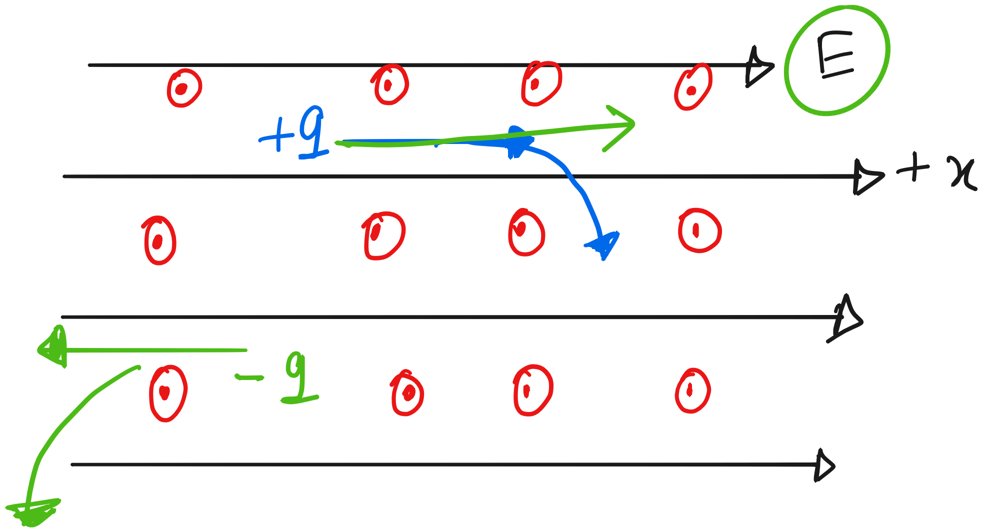
[IIT-JEE (Screening) 2000]

(a) Positive ions deflect towards $+y$ direction and negative ions towards $-y$ direction

(b) All ions deflect towards $+y$ direction

(c) All ions deflect towards $-y$ direction

(d) Positive ions deflect towards $-y$ direction and negative ions towards $+y$ direction



$\vec{v} = 2 \times 10^5 \hat{i}$, $\quad \vec{v} \times \vec{B}$

$2 \times 10^5 \hat{i} \times (\hat{i} + 4\hat{j} - 3\hat{k})$

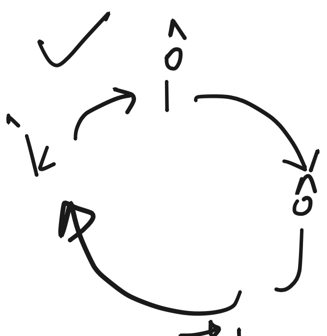
11. An electron moves with speed 2×10^5 *m/s* along the positive *x*-direction in the presence of a magnetic induction $B = \hat{i} + 4\hat{j} - 3\hat{k}$ (in *Tesla*.) The magnitude of the force experienced by the electron in Newton's is (charge on the electron = 1.6×10^{-19} *C*) **[EAMCET 2001]**

(a) 1.18×10^{-13} (b) 1.28×10^{-13}

(c) 1.6×10^{-13} (d) 1.72×10^{-13}

$\vec{F} = q(\vec{v} \times \vec{B})$

$2 \times 10^5 \hat{i} \times (\hat{i} + 4\hat{j} - 3\hat{k})$



$\vec{F} = (8 \times 10^5 \hat{k} + 6 \times 10^5 \hat{j})e$

$|\vec{F}| = 10^5 \sqrt{8^2 + 6^2} = 10^6 e$

$10^6 \times 1.6 \times 10^{-13}$

12. A particle of mass m and charge q moves with a constant velocity v along the positive x direction. It enters a region containing a uniform magnetic field B directed along the negative z direction, extending from $x = a$ to $x = b$. The minimum value of v required so that the particle can just enter the region $x > b$ is [IIT-JEE (Screening) 2002]

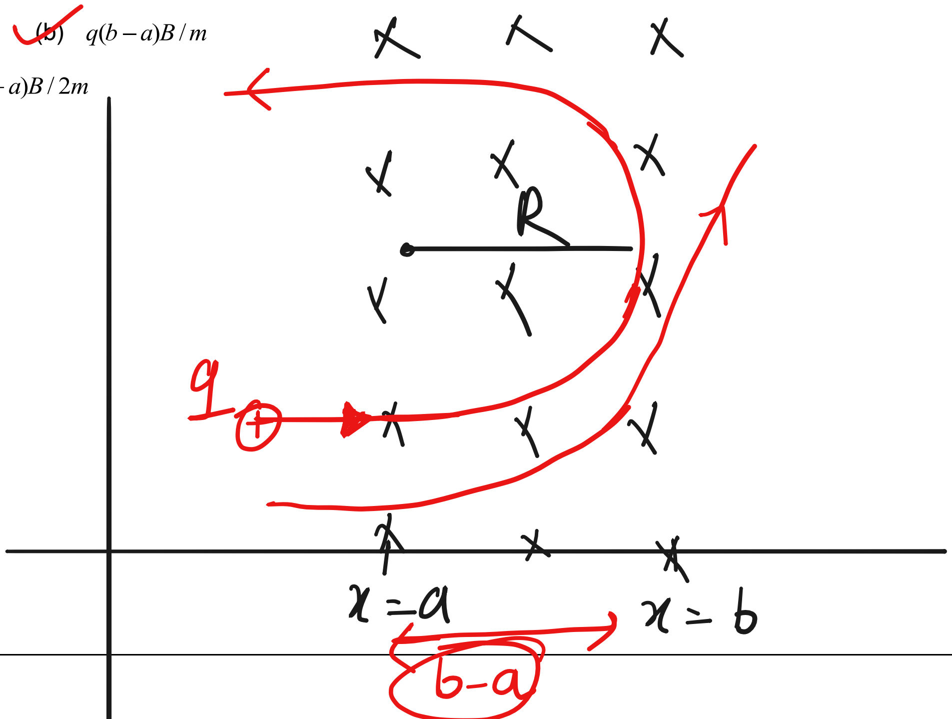
(a) qbB/m (b) $q(b-a)B/m$

(c) qaB/m (d) $q(b+a)B/2m$

$R = b - a$

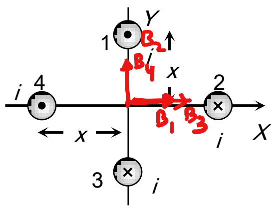
$R > b - a$

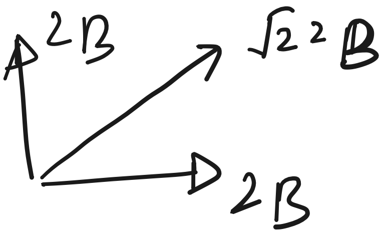
$\frac{mv}{qB} > b - a$



$$V \Rightarrow \frac{(b-a)\,qB}{m}$$

13. What will be the resultant magnetic field at origin due to four infinite length wires. If each wire produces magnetic field 'B' at origin





(a) $4B$ (b) $\sqrt{2}B$

(c) $2\sqrt{2}B$ ✓ (d) Zero

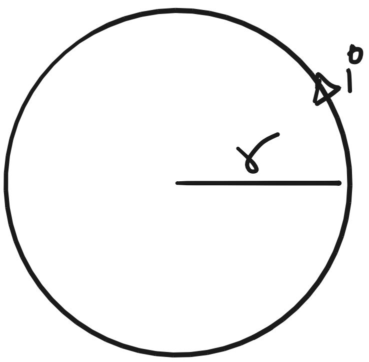
$$\frac{B_{circle}}{B_{square}} = \frac{\frac{\cancel{\mu_0 i}}{2r}}{\frac{4}{\sqrt{2}}\frac{\cancel{\mu_0 i}}{\pi a}}$$

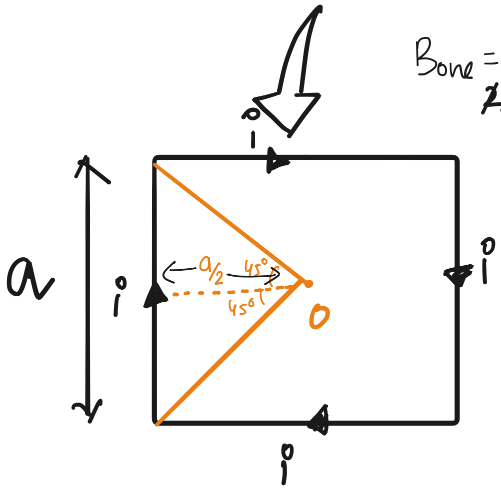
$$a = \frac{2\pi r}{4} = \frac{\pi r}{2} - (A)$$

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

$$4a = 2\pi r$$

$$B_{one} = \frac{\mu_0 i}{\cancel{2}4\pi\left(\frac{a}{\cancel{2}}\right)}[\cancel{2}\sin 45^\circ]$$





14. The ratio of the magnetic field at the centre of a current carrying circular wire and the magnetic field at the centre of a square coil made from the same length of wire will be

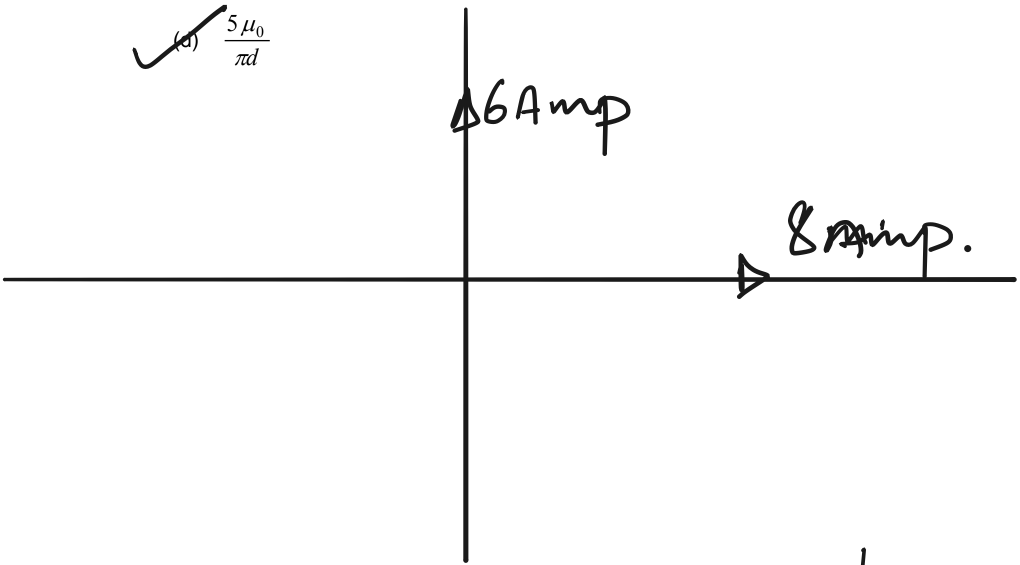
(a) $\frac{\pi^2}{4\sqrt{2}}$ (b) $\frac{\pi^2}{8\sqrt{2}}$

(c) $\frac{\pi^2}{2\sqrt{2}}$ (d) $\frac{\pi}{4\sqrt{2}}$

15. Two infinite length wires carries currents 8*A* and 6*A* respectively and placed along *X* and *Y*-axis. Magnetic field at a point $P(0,0,d)m$ will be

(a) $\frac{7\mu_0}{\pi d}$ (b) $\frac{10\mu_0}{\pi d}$

(c) $\frac{14\mu_0}{\pi d}$ (d) $\frac{5\mu_0}{\pi d}$



$$B_{Net} = \frac{\mu_0}{2\pi d}\left(i_1^2 + i_2^2\right)^{1/2}$$

$$= \frac{\mu_0}{2\pi d}(10) =$$

16. Figure shows the cross-sectional view of the hollow cylindrical conductor with inner radius 'R and outer radius '$2R$, cylinder carrying uniformly distributed current along it's axis. The magnetic induction at point 'P' at a distance $\frac{3R}{2}$ from the axis of the cylinder will be

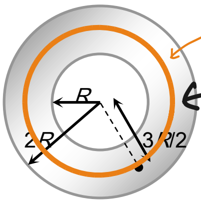
$i_{enclosed} = \frac{i}{\pi(2R)^2 - \pi R^2} \times \left(\pi\left(\frac{3R}{2}\right)^2 - \pi R^2\right)$

(a) Zero

(b) $\frac{5\mu_0 i}{72\pi R}$

(c) $\frac{7\mu_0 i}{18\pi R}$

(d) $\frac{5\mu_0 i}{36\pi R}$



imaginary loop

$\cancel{2}\pi\left(\frac{3R}{\cancel{2}}\right) = 3\pi R$

current in unit Area $= \frac{i}{\pi(4R^2 - R^2)}$

$\oint B\,dl = \mu_0 i_{enclose}$

$B\,3\pi R = \mu_0 \frac{5i}{12}$

$B = \frac{5\mu_0 i}{36\pi R}.$

$i_{enclosed} = \frac{i}{\cancel{\pi}\, 3\cancel{R^2}}\left(\cancel{\pi}\left(\frac{3R}{2}\right)^2 - \cancel{\pi R^2}\right)$

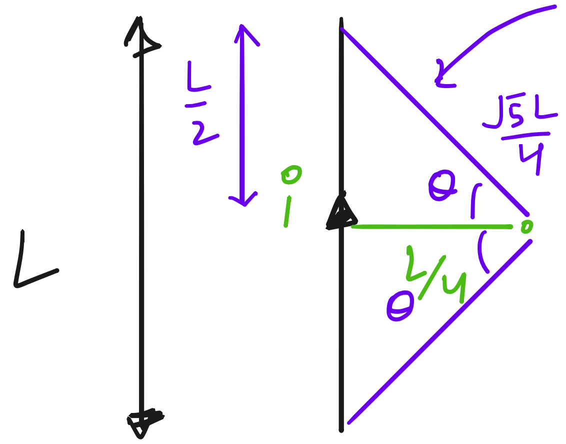
$= \frac{i}{3}\left(\frac{9}{4} - 1\right)$

$i_{enclose} = \frac{i}{3}\left(\frac{5}{4}\right) = \frac{5i}{12}$

17. A current *i* is flowing in a straight conductor of length *L*. The magnetic induction at a point distant $\frac{L}{4}$ from its centre will be

(a) $\frac{4\mu_0 i}{\sqrt{5}\pi L}$ (b) $\frac{\mu_0 i}{2\pi L}$

(c) $\frac{\mu_0 i}{\sqrt{2}L}$ (d) Zero



$$\sqrt{\frac{L^2}{4}+\frac{L^2}{16}} = L\sqrt{\frac{5}{16}}$$

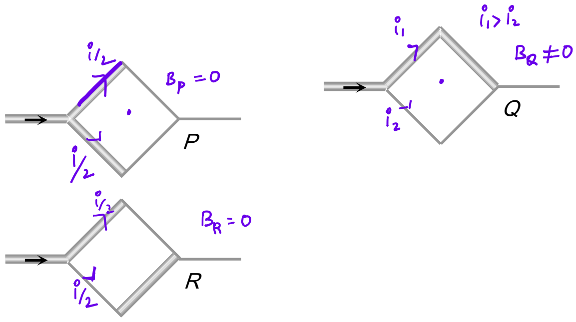
$$\sin\theta = \frac{\cancel{L}/2}{\frac{\sqrt{5}\cancel{L}}{4}}$$

$$\sin\theta = \frac{2}{\sqrt{5}}$$

$$\frac{\mu_0 i}{\cancel{4}\pi \frac{L}{\cancel{4}}}\left[2\sin\theta\right]$$

$$B = \frac{\mu_0 i}{\pi L}\frac{4}{\sqrt{5}}$$

18. Two thick wires and two thin wires, all of the same materials and same length form a square in the three different ways *P*, *Q* and *R* as shown in fig with current connection shown, the magnetic field at the centre of the square is zero in cases



(a) In *P* only
(b) In *P* and *Q* only
(c) In *Q* and *R* only
(d) *P* and *R* only

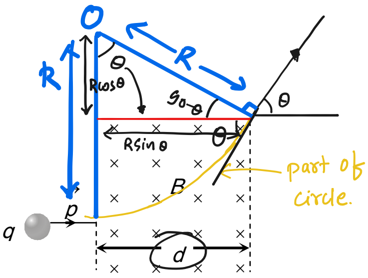
19. A particle with charge q, moving with a momentum p, enters a uniform magnetic field normally. The magnetic field has magnitude B and is confined to a region of width d, where $d < \frac{p}{Bq}$, The particle is deflected by an angle θ in crossing the field

(a) $\sin\theta = \frac{Bqd}{p}$

(b) $\sin\theta = \frac{p}{Bqd}$

(c) $\sin\theta = \frac{Bp}{qd}$

(d) $\sin\theta = \frac{pd}{Bq}$



$d < r$

$r = \frac{p}{qB} = \frac{mV}{qB}$

$R\sin\theta = d$

$\sin\theta = \frac{d}{R} = \frac{d}{\frac{p}{qB}}$

$\sin\theta = \frac{dqB}{p} = \frac{dqB}{mv}$

$$r = \frac{\sqrt{2mq\Delta V}}{qB} = \frac{\sqrt{2\times \cancel{1}.67\times 10^{-27}\times \cancel{1.6}\times 10^{-19}\times 500\times 10^{3}}}{\cancel{1}.6\times 10^{-19}\times 0.51}$$

$$\frac{10^{-20}}{10^{-19}\times 0.51} = \frac{1}{5}$$

NEET

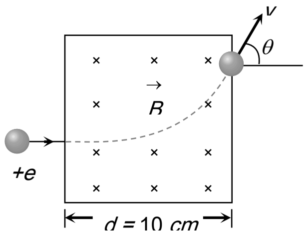
20. A proton accelerated by a potential difference $500\ KV$ moves though a transverse magnetic field of $0.51\ T$ as shown in figure. The angle θ through which the proton deviates from the initial direction of its motion is

(a) 15^o

(b) 30^o

(c) 45^o

(d) 60^o



$$\sin\theta = \frac{d}{R} = \frac{d}{\frac{mv}{qB}}$$

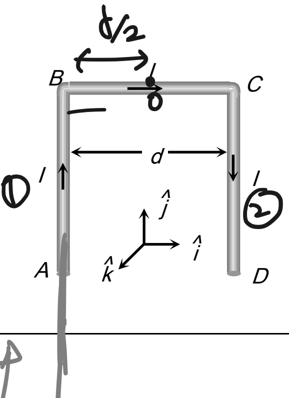
$$\sin\theta = \frac{0.1}{0.2} = \frac{1}{2} \qquad \sin\theta = \frac{10\,cm}{\frac{\sqrt{2mq\Delta V}}{qB}}$$

21. *AB* and *CD* are long straight conductor, 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) $\frac{-\mu_0 I}{4\pi d}\hat{k}$



$B_1 = \frac{\mu_0 i}{\cancel{2}4\pi \frac{d}{\cancel{2}}} \otimes$

$B_2 = \frac{\mu_0 i}{2\,4\pi \frac{d}{2}} \otimes$

$B_{Net} = \frac{\mu_0 i}{\pi d}(-\hat{k})$

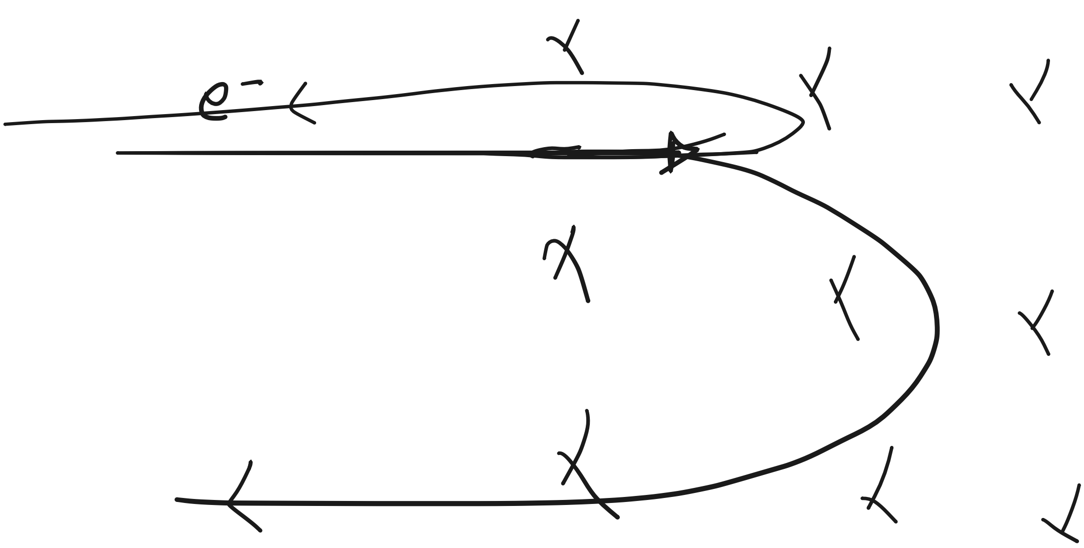
∞ ↑

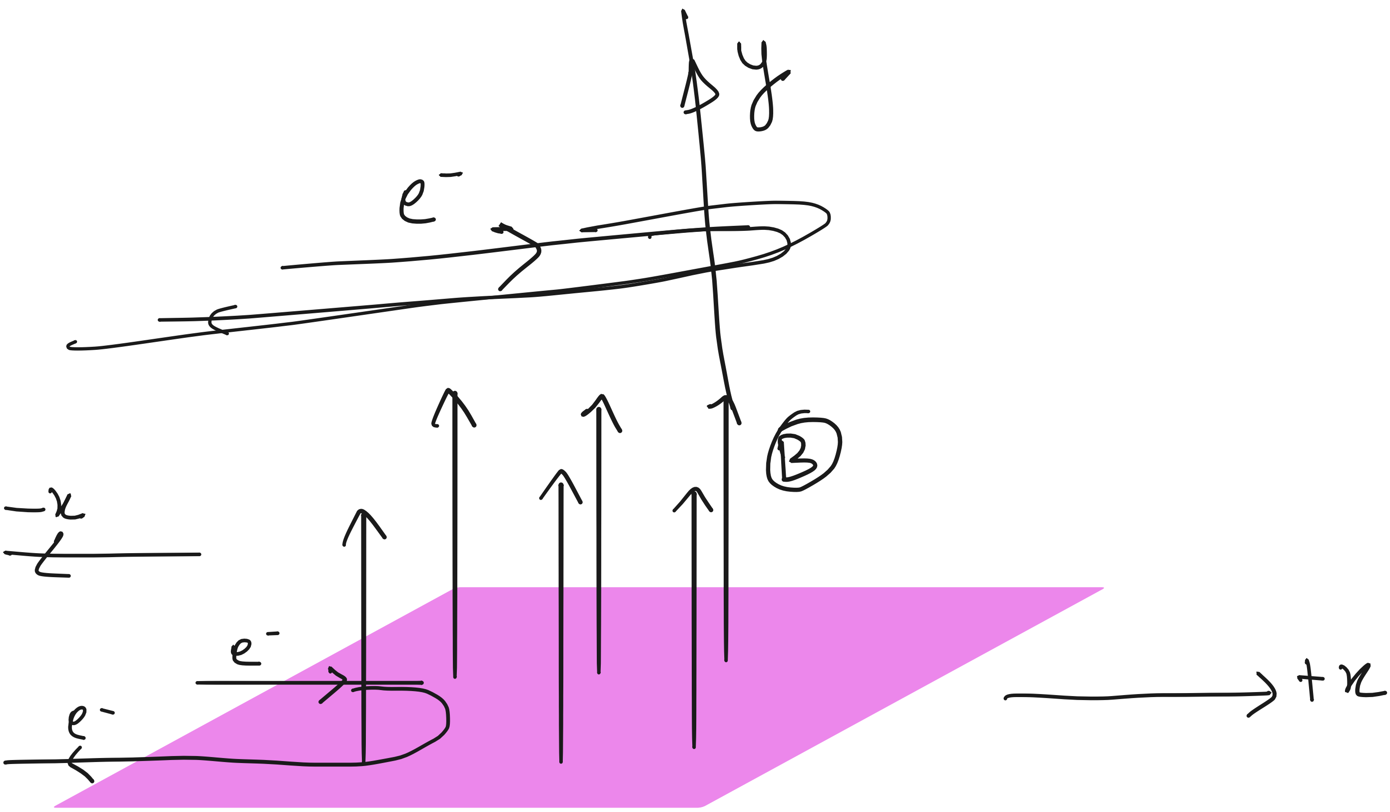
(d) $\frac{-\mu_0 I}{8\pi d}\hat{k}$

22. An electron is moving along the positive X-axis. You want to apply a magnetic field for a short time so that the electron may reverse its direction and move parallel to the negative X-axis. This can be done by applying the magnetic field along

(a) Y-axis (b) X-axis

(c) Y-axis only (d) None of these





H.W.

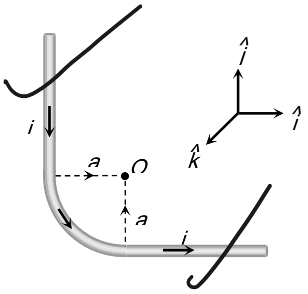
23. The unit vectors $\hat{i}, \hat{j}$ and $\hat{k}$ are as shown below. What will be the magnetic field at O in the following figure

(a) $\frac{\mu_0}{4\pi}\frac{i}{a}\left(2-\frac{\pi}{2}\right)\hat{j}$

(b) $\frac{\mu_0}{4\pi}\frac{i}{a}\left(2+\frac{\pi}{2}\right)\hat{j}$

(c) $\frac{\mu_0}{4\pi}\frac{i}{a}\left(2+\frac{\pi}{2}\right)\hat{i}$

(d) $\frac{\mu_0}{4\pi}\frac{i}{a}\left(2+\frac{\pi}{2}\right)\hat{k}$

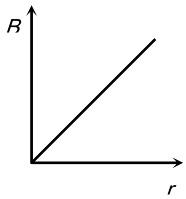


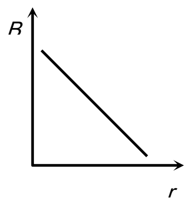
$$B = \frac{\mu_0 i}{2\pi R} \times \frac{2}{2} \quad \frac{\mu_0 i}{2R} \times \frac{1}{4}$$

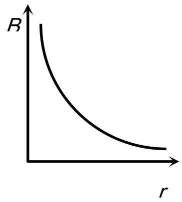
$$= \frac{\mu_0 i}{4\pi R}\left[\frac{2}{1} + \frac{\pi}{2}\right]$$

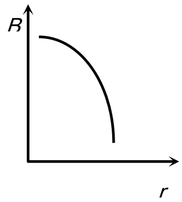
24. Which of the following graphs shows the variation of magnetic induction B with distance r from a long wire carrying current

[NCERT 1984; MNR 1998; MP PMT 1999]

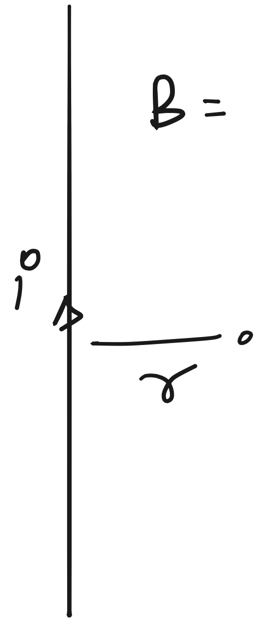
(a)


(b)


(c)


(d)


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



$$B \propto \frac{1}{r}$$

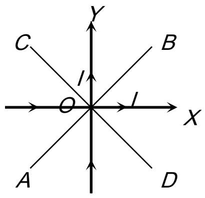
25. Two very thin metallic wires placed along *X* and *Y*-axis carry equal currents as shown here. *AB* and *CD* are lines at $45°$ with the axes with origin of axes at *O*. The magnetic field will be zero on the line [MP PMT 1995; CBSE PMT 1996]

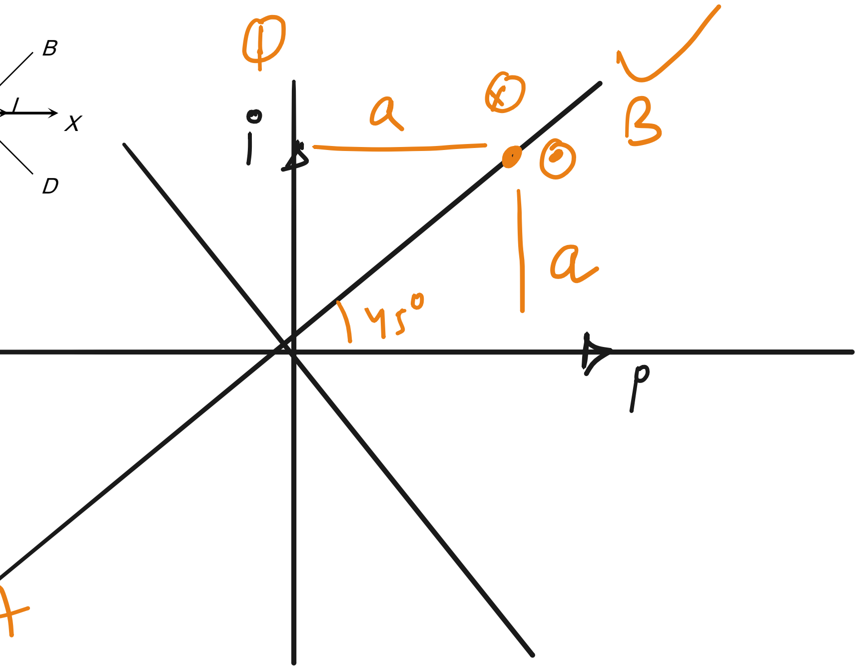
(a) *AB*

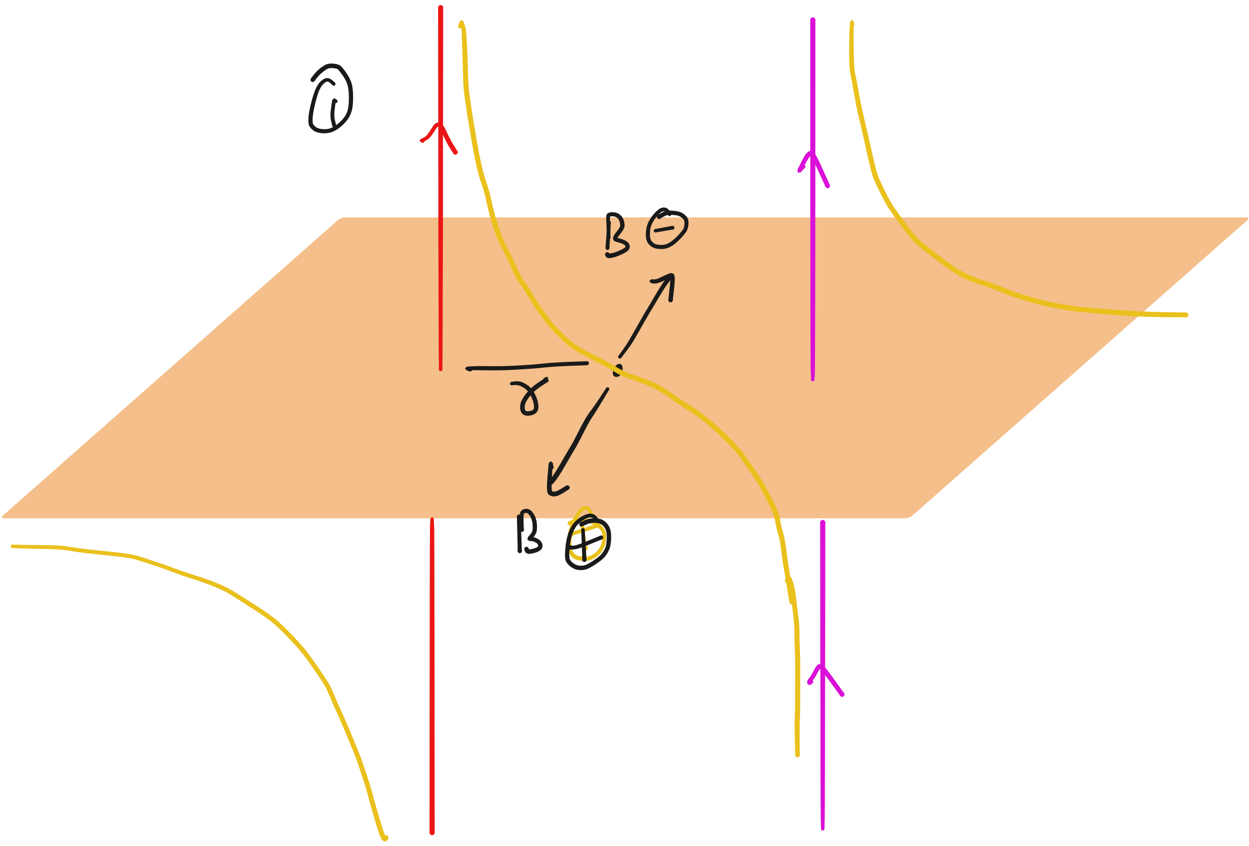
(b) *CD*

(c) Segment *OB* only of line *AB*

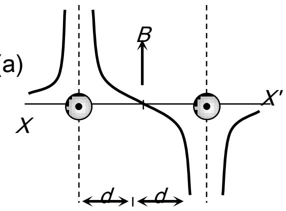
(d) Segment *OC* only of line *CD*

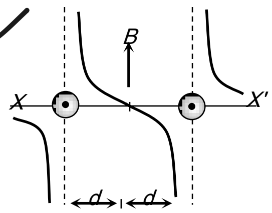


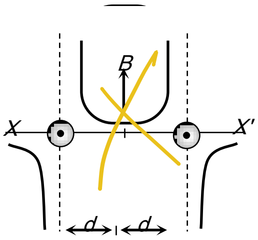


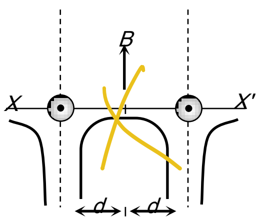


26. Two long parallel wires are at a distance $2d$ apart. They carry steady equal currents flowing out of the plane of the paper, as shown. The variation of the magnetic field B along the line XX' is given by [IIT-JEE (Screening) 2000]

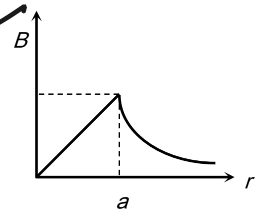
(a) 

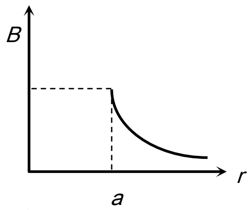
(b) 

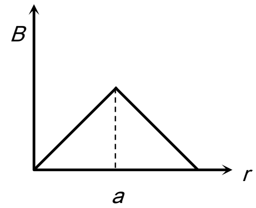
(c) 

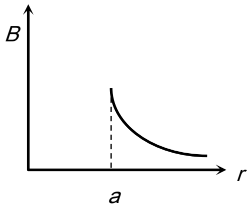
(d) 

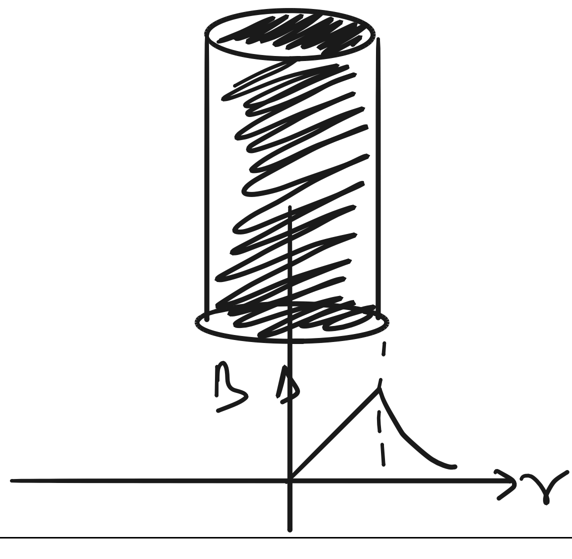
27. The magnetic field due to a straight conductor of uniform cross section of radius a and carrying a steady current is represented by **[AIIMS 2004]**

(a)


(b)


(c)


(d)




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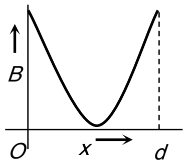
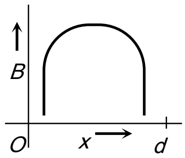
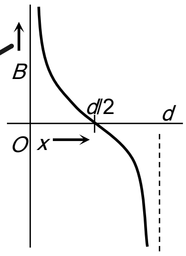
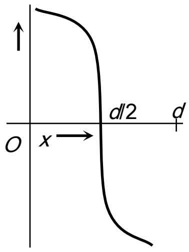
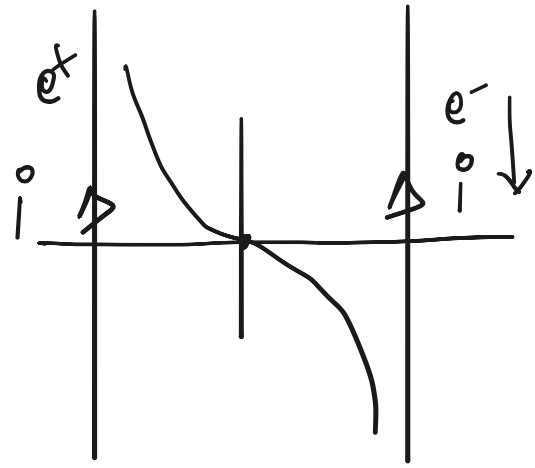
24. Two parallel beams of protons and electrons, carrying equal currents are fixed at a separation *d*. The protons and electrons move in opposite directions. *P* is a point on a line joining the beams, at a distance *x* from any one beam. The magnetic field at *P* is *B*. If *B* is plotted against *x*, which of the following best represents the resulting curve

(a)


(b)


(c)


(d)




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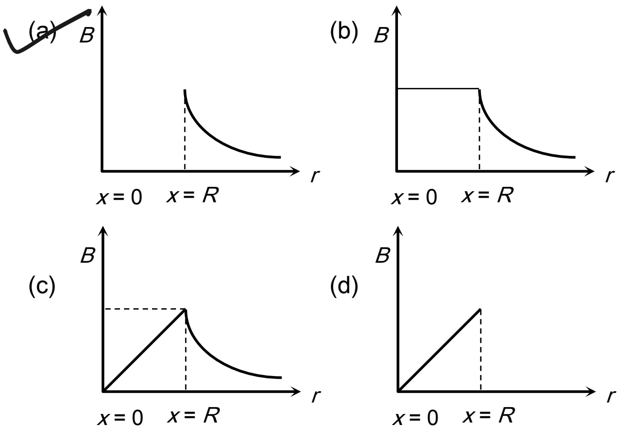
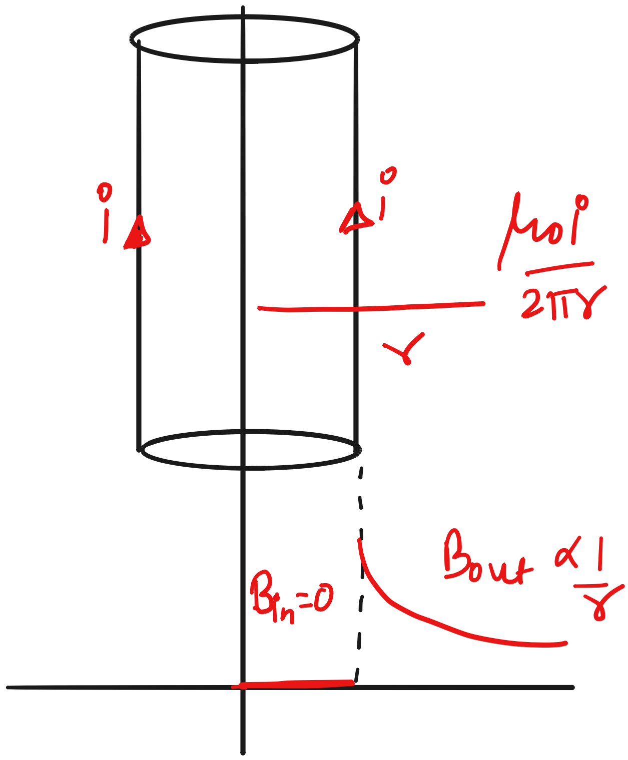
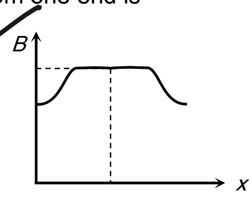
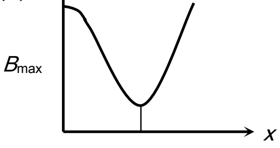
25. A long thin hollow metallic cylinder of radius '*R*' has a current *i ampere*. The magnetic induction '*B*'-away from the axis at a distance *r* from the axis varies as shown in

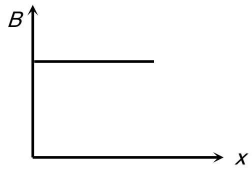


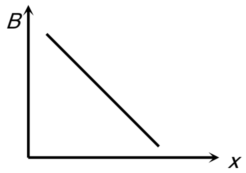


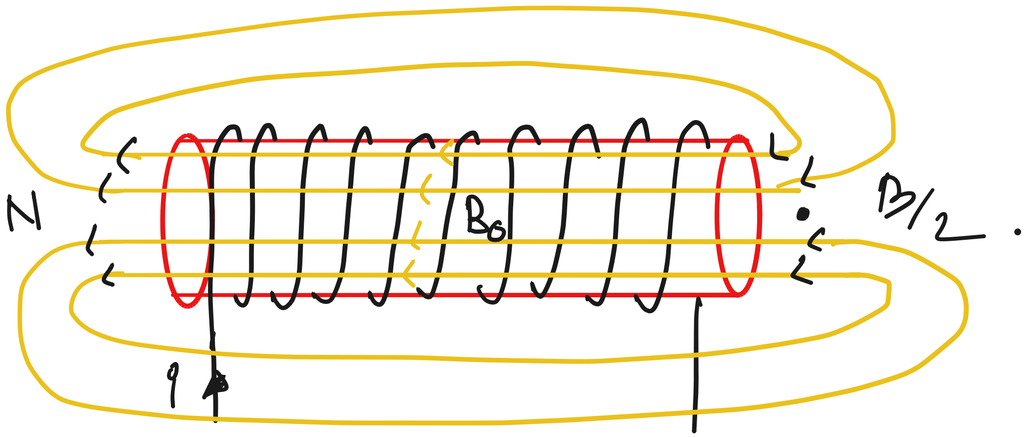
26. The correct curve between the magnetic induction (B) along the axis of a long solenoid due to current flow i in it and distance x from one end is

(a)


(b)


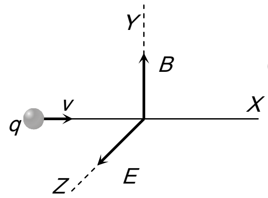
(c)


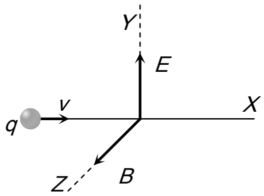
(d)


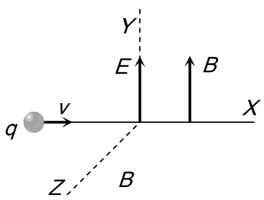


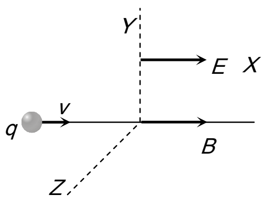
H.W.

27. A particle of charge q and mass m is moving along the x-axis with a velocity v and enters a region of electric field E and magnetic field B as shown in figure below for which figure the net force on the charge may be zero

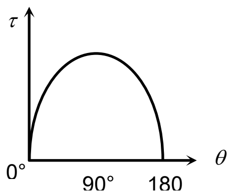
(a)


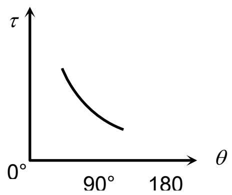
(b)


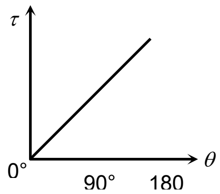
(c)


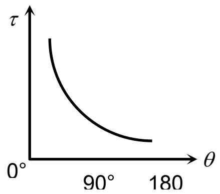
(d)


28. The ($\tau - \theta$) graph for a coil is

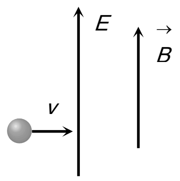
(a) 

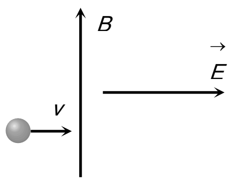
(b) 

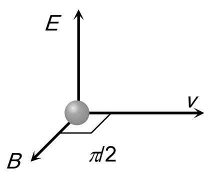
(c) 

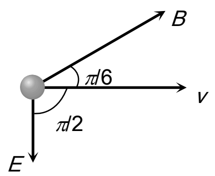
(d) 

29. A uniform magnetic field B and a uniform electric field E act in a common region. An electron is entering this region of space. The correct arrangement for it to escape undeviated is

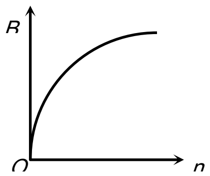
(a) 

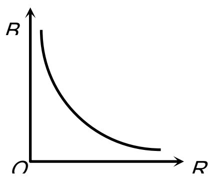
(b) 

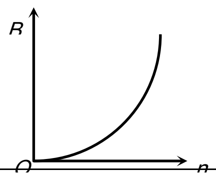
(c) 

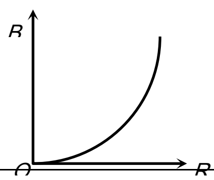
(d) 

30. A thin wire of length l is carrying a constant current. The wire is bent to form a circular coil. If radius of the coil, thus formed, is equal to R and number of turns in it is equal to n, then which of the following graphs represent (s) variation of magnetic field induction (B) at centre of the coil

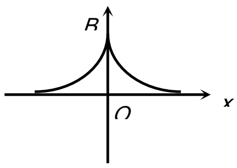
(a) 

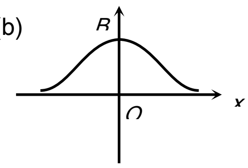
(b) 

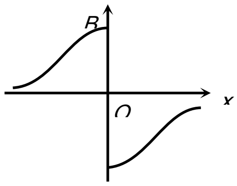
(c) 

(d) 

31. A circular coil is in *y-z* plane with centre at origin. The coil is carrying a constant current. Assuming direction of magnetic field at *x* = – 25 *cm* to be positive direction of magnetic field, which of the following graphs shows variation of magnetic field along *x*-axis

(a) 

(b) 

(c) 

(d)