PHYSICS

BOOKS - UNIVERSAL BOOK DEPOT 1960 PHYSICS (HINGLISH)

MAGNETIC EFFECT OF CURRENT

Exercise

1. A length of wire carries a steady current I. It is bent first to form a circular plane coil of one turn. The same length is now bent more sharply to give double loop of smaller radius. If the same current I is passed, the ratio of the magnitude of magnetic field at the centre with its first value is:

A. A quarter of its first value

B. Unaltered

C. Four times of its first value

D. A half of its first value

Answer: C

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2. A vertical straight conductor carries a current vertically upwards. A point P lies to the east of it at a small distance and another point Q lies to the west at the same distance. The magnetic field at P is

A. Greater than at Q

B. Same as at Q

C. Less than at Q

D. Greater or less than at Q depending upon the strength of the current

Answer: B

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3. If a long hollow copper pipe carriers a direct current, the magnetic field associated with the current will be:

A. Only inside the rod

B. Only outside the rod

C. Both inside and outside the rod

D. Neither inside nor outside the rod

Answer: C

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4. If a long hollow copper pipe carriers a direct current, the magnetic field associated with the current will be:

A. Only inside the pipe

B. Only outside the pipe

C. Neither inside nor outside the pipe

D. Both inside and outside the pipe

Answer: B

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5. The magnetic field $\overrightarrow{dB}$ due to a small current element $\overrightarrow{dl}$ at a distance $\overrightarrow{r}$ and carrying current $'I'$ is

A. $\overrightarrow{dB} = \frac{\mu_0}{4\pi}\left(\frac{\overrightarrow{dl} \times \overrightarrow{r}}{r}\right)$

B. $\overrightarrow{dB} = \frac{\mu_0}{4\pi}\left(\frac{\overrightarrow{dl} \times \overrightarrow{r}}{r}\right)$

C. $\overrightarrow{dB} = \frac{\mu_0}{4\pi}I^2\left(\frac{\overrightarrow{dl} \times \overrightarrow{r}}{r^2}\right)$

D. $\overrightarrow{dB} = \frac{\mu_0}{4\pi}I\left(\frac{\overrightarrow{dl} \times \overrightarrow{r}}{r^3}\right)$

Answer: D

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6. A charge q coulomb moves in a circle at n revolution per second and the radius of the circle is r metre. Then magnetic feild at the centre of the circle is

A. $\frac{2\pi q}{nr} \times 10^{-7} N / amp / metre$

B. $\frac{2\pi q}{r} \times 10^{-7} \times 10^{-7} N / amp / metre$

C. $\frac{2\pi nq}{r} \times 10^{-7} N / amp / metre$

D. $\frac{2\pi q}{r} N / amp / metre$

Answer: C

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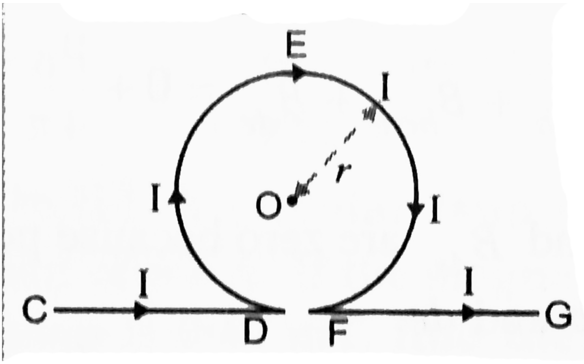
7. If a long horizontal conductor is bent as shown in figure and a current I is passed in it, find the magnitude and direction of magnetic field induction at the centre of circular part.



A. $\frac{\mu_0}{4\pi}\frac{2i}{r}(\pi+1)$

B. $\frac{\mu_0}{4\pi}\frac{2i}{r}(\pi-1)$

C. Zero

D. Infinite

Answer: B

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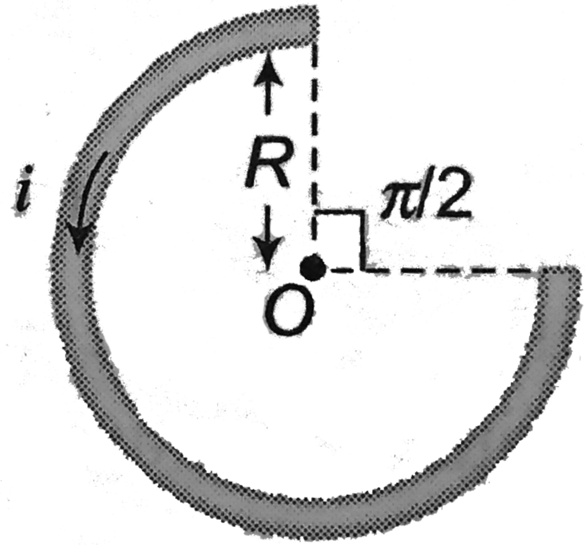
8. A current i ampere flows in a circular arc of wire whose radius is R, which subtend an angle $3\pi/2$ radian at its centre. The magnetic induction B at the centre is



A. $\frac{\mu_0 i}{R}$

B. $\frac{\mu_0 i}{2R}$

C. $\frac{2\mu_0 i}{R}$

D. $\frac{3\mu_0 i}{8R}$

Answer: D

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9. A current i ampere flows along the inner conductor of a coaxial cable and returns along the outer conductor fo the cable, then the magnetic induction at any point outside the conductor at a distance r metre from the axis is

A. ∞

B. Zero

C. $\frac{\mu_0}{4\pi}\frac{2i}{r}$

D. $\frac{\mu_0}{4\pi}\frac{2\pi i}{r}$

Answer: B

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10. A straight section PQ of a circuit lies along the X-axis from $x = -\frac{a}{2}$ to $x = \frac{a}{2}$ and carriers a steady current i. The magnetic field due to the section PQ at a point $X = +a$ will be

A. Proportional to a

B. Proportional to a^2

C. Proportional to $1/a$

D. Zero

Answer: D

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11. A helium nucleus makes a full rotation in a circle of radius 0.8 metre in two seconds. The value of the magnetic field B at the centre of the circle will be

A. $\frac{10^{-19}}{\mu_0}$

B. $10^{-19}\mu_0$

C. $2 \times 10^{-10}\mu_0$

D. $\frac{2 \times 10^{-10}}{\mu_0}$

Answer: B

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12. A solenoid of 1.5 metre length and 4.0 cm diameter posses 10 turn per cm. A current of 5 ampere is flowing through it. The magnetic induction at axis inside the solenoid is

A. $2\pi \times 10^{-3}$ Tesla

B. $2\pi \times 10^{-5}$ Tesla

C. $4\pi \times 10^{-2}$ Gauss

D. $2\pi \times 10^{-5}$ Gauss

Answer: A

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13. The magnetic induction at apoint P which is at the distance 4 cm from a long current carrying wire is $10^{-3}T$. The field of induction at a distance 12 cm from the current will be

A. 3.33×10^{-4} Tesla

B. 1.11×10^{-4} Tesla

C. 3×10^{-3} Tesla

D. 9×10^{-2} Tesla

Answer: A

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14. The strength of the magnetic field at a point r near a long straight current carrying wire is B. The field at a distance $\frac{r}{2}$ will be

A. $\frac{B}{2}$

B. $\frac{B}{4}$

C. $2B$

D. $4B$

Answer: C

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15. Field at the centre of a circular coil of radius r, through which a current I flows is

A. Directly proportional to r

B. Inversely proportional to I

C. Directly proportional to I

D. Directly proportional to I^2

Answer: C

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16. A current of $0.1A$ circulates around a coil of 100 turns and having a radius equal to $5cm$. The magnetic field set up at the centre of the coil is

($\mu_0 = 4\pi \times 10^{-7}$ weber/amper-metre)

A. $4\pi \times 10^{-5}$ tesla

B. $8\pi \times 10^{-5}$ tesla

C. 4×10^{-5} tesla

D. 2×10^{-5} tesla

Answer: A

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17. The magnetic field B with in the solenoid having n turns per metre length and carrying a current of i ampere is given by

A. $\frac{\mu_0}{e}$

B. $\mu_0 ni$

C. $4\pi\mu_0 ni$

D. ni

Answer: B

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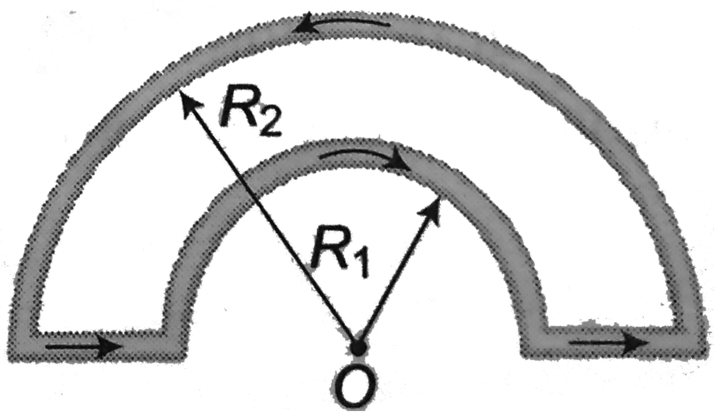
18. The magnetic induction at the centre O in the figure shown in



A. $\frac{\mu_0 i}{4}\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

B. $\frac{\mu_0 i}{4}\left(\frac{1}{R_1}+\frac{1}{R_2}\right)$

C. $\frac{\mu_0 i}{4}(R_1 - R_2)$

D. $\frac{\mu_0 i}{4}(R_1 + R_2)$

Answer: A

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19. Field inside a solenoid is

A. Directly proportional to its length

B. Directly proportional to current

C. Inversely proportional to total number of turns

D. Inversely proportional to current

Answer: B

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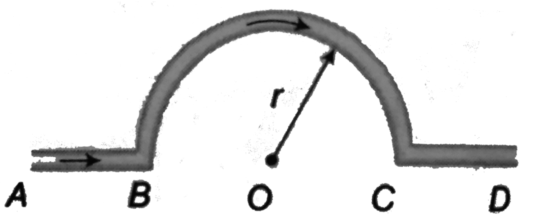
20. In the figure shown, the magnetic induction at the centre of the arc due to the current in portion AB will be



A. $\frac{\mu_0 i}{r}$

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

C. $\frac{\mu_0 i}{4r}$

D. Zero

Answer: D

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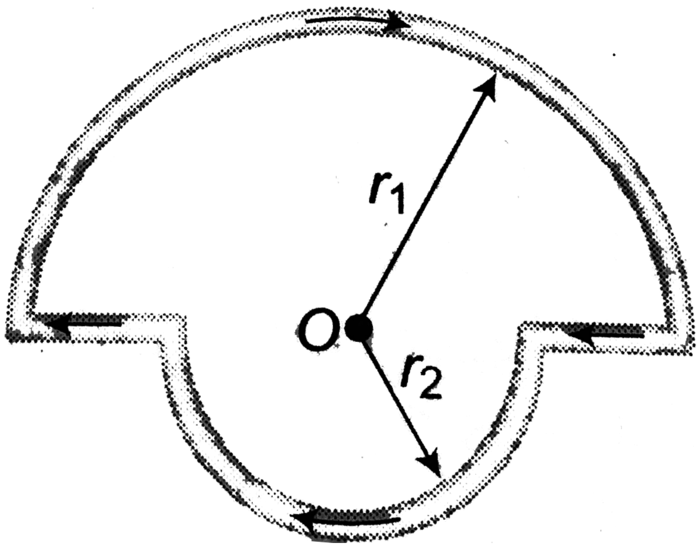
21. In the figure shown there are two semicircles of radii r_1 and r_2 in which a current i is flowing. The magnetic induction at the centre O will be



A. $\frac{\mu_0 i}{r}(r_1 + r_2)$

B. $\frac{\mu_0 i}{4}(r_1 - r_2)$

C. $\mu_0 i\left(r_1 + \frac{r_2}{r_1 r_2}\right)$

D. $\frac{\mu_0 i}{4}\left(\frac{r_2 - r_1}{r_1 r_2}\right)$

Answer: C

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22. The magnetic moment of a current carrying loop is $2.1 \times 10^{-25} amp \times m^2$. The magnetic field at a point on its axis at a distance of 1Å is

A. $4.2 \times 10^{-2}\text{weber} / m^2$

B. $4.2 \times 10^{-3}\text{weber} \times m^2$

C. $4.2 \times 10^{-4}\text{weber} / m^2$

D. $4.2 \times 10^{-5}\text{weber} / m^2$

Answer: A

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23. Two straight horizontal parallel wires are carrying the same current in the same direction, d is the distance between the wires, You are provided with a small frelly suspended magnetic needle. At which of the following positions will the orientions of the needle be independent of the magntitude of the current in the wires?

A. At a distance $d/2$ from any of the wires

B. At a distance $d/2$ from any of the wires in the horizontal plane

C. Anywhere on the circumference of a vertical circle of radius d and centre halfway between the wires

D. At points halfway between the wires in the horizontal plane

Answer: D

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24. A particle carrying a charge equal to 100 times the charge on an electron is rotating per second in a circular path of radius $0.8 metre$. The value of the magnetic field produced at the centre will be ($\mu_0 =$ permeability for vacuum)

A. $\frac{10^{-7}}{\mu_0}$

B. $10^{-17}\mu_0$

C. $10^{-6}\mu_0$

D. $10^{-7}\mu_0$

Answer: B

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25. A circular coil of radius R carries an electric current. The magnetic field due to the coil at a point on the axis of the coil located at a distance r from the centre of the coil, such that $r > > R$, varies as

A. $\frac{1}{r}$

B. $\frac{1}{r^{3/2}}$

C. $\frac{1}{r^2}$

D. $\frac{1}{r^3}$

Answer: D

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26. In hydrogen atom, an electron is revolving in the orbit of radius 0.53Å with $6.6 \times 10^{15} rotations / \sec ond$. Magnetic field produced at the centre of the orbit is

A. $0.125 wb / m^2$

B. $1.25 wb / m^2$

C. $12.5 wb / m^2$

D. $125 wb / m^2$

Answer: C

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27. The magnetic induction due to an infinitely long straight wire carrying a current i at a distance r from wire is given by

A. $|B| = \left(\frac{\mu_0}{4\pi}\right)\frac{2i}{r}$

B. $|B| = \left(\frac{\mu_0}{4\pi}\right)\frac{r}{2i}$

C. $|B| = \left(\frac{4\pi}{\mu_0}\right)\frac{2i}{r}$

D. $|B| = \left(\frac{4\pi}{\mu_0}\right)\frac{r}{2i}$

Answer: A

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28. Magnetic effect of current was discovered by

A. Faraday

B. Oersted

C. Ampere

D. Bohr

Answer: B

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29. Two concentric circular coils of ten turns each are situated in the same plane. Their radii are 20 and $40cm$ and they carry respectively 0.2 and 0.3 ampere current in opposite direction. The magnetic field in Wb/m^3 at the centre is

A. $\frac{35}{4}\mu_0$

B. $\frac{\mu_0}{80}$

C. $\frac{7}{80}\mu_0$

D. $\frac{5}{4}\mu_0$

Answer: D

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30. A long solenoid has a radius a and number of turns per unit length is n. If it carries a current i, then the magnetic field on its axis is directly proportional to

A. ani

B. ni

C. $\frac{ni}{a}$

D. n^2i

Answer: B

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31. A cell is connected between two points of a uniformly thick circular conductor. The magnetic field at the centre of the loop will be

(Here i_1 and i_2 are the currents flowing in the two parts of the circular conductor of radius $'a'$ and μ_0 has the usual meaning)

A. Zero

B. $\frac{\mu_0}{2a}(i_1 - i_2)$

C. $\frac{\mu_0}{2a}(i_1 + i_2)$

D. $\frac{\mu_0}{a}(i_1 + i_2)$

Answer: A

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32. A long solenoid is formed by winding 20 turns cm^{-1}. What current is necessary to produce a magnetic field of 20 mT inside the solenoid?

A. $8.0A$

B. $4.0A$

C. $2.0A$

D. $1.0A$

Answer: A

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33. A battery is connected between two points A and B on the circumference of a uniform conducting ring of radius r and resistance R. One of the arcs AB of the ring subtends an angle θ at the centre. The value of the magnetic induction at the centre due to the current in the ring is

A. Proportional to $2(180^\circ - \theta)$

B. Inversely proportional to r

C. Zero, only if $\theta = 180^{\circ}$

D. Zero for all values of θ

Answer: D

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34. A current of one ampere is passed through a straight wire of length $2 \cdot 0$ metre. Find the magnetic field at a point in air at a distance 3 metre from one end of wire but lying on the axis of the wire.

A. $\frac{\mu_0}{2\pi}$

B. $\frac{\mu_0}{4\pi}$

C. $\frac{\mu_0}{8\pi}$

D. Zero

Answer: D

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35. A long copper tube of inner radius R carriers a current i. The magnetic field B inside the tube is

A. $\frac{\mu_0 i}{2\pi R}$

B. $\frac{\mu_0 i}{4\pi R}$

C. $\frac{\mu_0 i}{2R}$

D. Zero

Answer: D

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36. A straight wire of length $(2\pi^2)$ metre is carrying a current of $2A$ and the magnetic field due to it is measured at a point distant $1cm$ from it. If the wire is to be bent into a circle and is to carry the same current as before, the ratio of the magnetic field at its centre to that obtained in the first case would be

A. $50:1$

B. $1:50$

C. $100:1$

D. $1:100$

Answer: B

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37. The direction of magnetic field lines due to straight conductor carrying current is given by.................... .

A. Along the length of the conductor

B. Radially outward

C. Circular in a plane perpendicular to the conductor

D. Helical

Answer: C

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38. If the strength of the magnetic field produced 10cm away from a infinitely long straight conductor is $10^{-5}\text{Weber}/m^2$, the value of the current flowing in the conductor will be

A. 5 ampere

B. 10 ampere

C. 500 ampere

D. 1000 ampere

Answer: A

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39. Due to 10 ampere of current flowing in a circular coil of $10cm$ radius, the magnetic field produced at its centre is $3.14 \times 10^{-3} Weber / m^3$. The number of turns in the coil will be

A. 5000

B. 100

C. 50

D. 25

Answer: C

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40. There are 50 turns of a wire in every cm length of a long solenoid. If 4 ampere current is flowing in the solenoid, the approximate value of magnetic field along its axis at an internal point and at one end will be respectively

A. $12.6 \times 10^{-3} \text{Weber} / m^2, 6.3 \times 10^{-3} \text{Weber} / m^{20}$

B. $12.6 \times 10^{-3} \text{Weber} / m^2, 25.1 \times 10^{-3} \text{Weber} / m^2$

C. $25.1 \times 10^{-3} \text{Weber} / m^2, 12.6 \times 10^{-3} \text{Weber} / m^2$

D. $25.1 \times 10^{-5} \text{Weber} / m^2, 12.6 \times 10^{-5} \text{Weber} / m^2$

Answer: C

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41. A solenoid is 1.0 metre long and it has 4250 turns. If a current of 5.0 ampere is flowing through it, what is the magnetic field at its centre $\left[\mu_0 = 4\pi \times 10^{-7} \text{Weber} / amp - m\right]$

A. $5.4 \times 10^{-2} \text{weber} / m^2$

B. $2.7 \times 10^{-2} \text{weber} / m^2$

C. $1.35 \times 10^{-2} \text{weber} / m^2$

D. $0.675 \times 10^{-2} \text{weber} / m^2$

Answer: B

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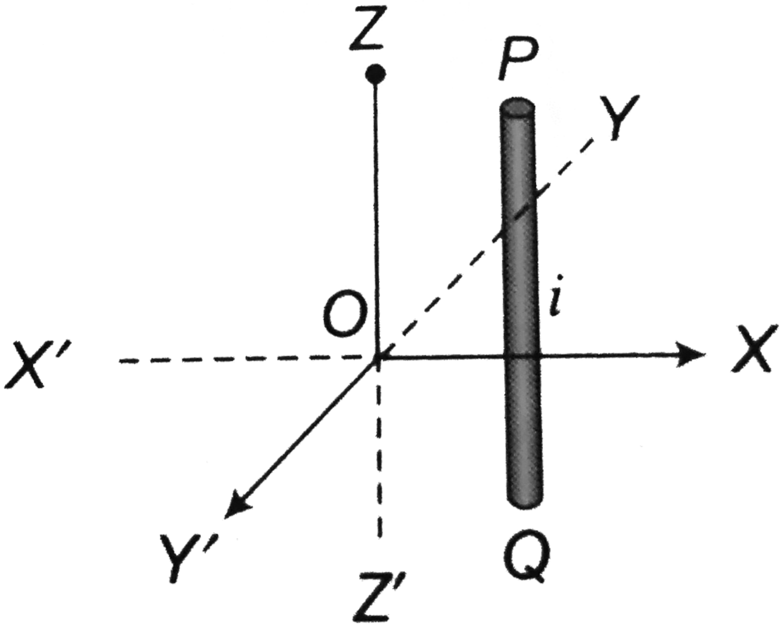
42. A vertical wire kept in $Z - X$ plane carries a current from Q to P (see figure). The magnetic field due to current will have the direction at the origin O along



A. OX

B. OX'

C. OY

D. OY'

Answer: D

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43. On meter length of wires carriers a constant current. The wire is bent to from a circular loop. The magnetic field at the centre of this loop is B. The same is now bent to form a circular loop of smaller radius to have four turns in the loop. The magnetic field at the centre of this loop B. The same is now bent to form a circular loop of smaller radius of have four turns in the loop. The magnetic field at the centre of this new loop is

A. $4B$

B. $16B$

C. $B/2$

D. $B/4$

Answer: B

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44. In a hydrogen atom, an electron moves in a circular orbit of radius $5.2 \times 10^{-11} m$ and produces a magnetic induction of $12.56 T$ at it nucleus. The current produced by the motion of the electron will be (Given $\mu_0 = 4\pi \times 10^{-7} W / bA - m$)

A. 6.53×10^{-3} ampere

B. 13.25×10^{-10} ampere

C. 9.6×10^{6} ampere

D. 1.04×10^{-3} ampere

Answer: D

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45. An arc of a circle of raduis R subtends an angle $\frac{\pi}{2}$ at the centre. It carriers a current i. The magnetic field at the centre will be

A. $\frac{\mu_0 i}{2R}$

B. $\frac{\mu_0 i}{8R}$

C. $\frac{\mu_0 i}{4R}$

D. $\frac{2\mu_0 i}{5R}$

Answer: B

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46. At a distance of $10cm$ from a long straight wire carrying current, the magnetic field is $0.04T$. At the distance of $40cm$, the magnetic field will be

A. $0.01T$

B. $0.02T$

C. $0.08T$

D. $0.16T$

Answer: A

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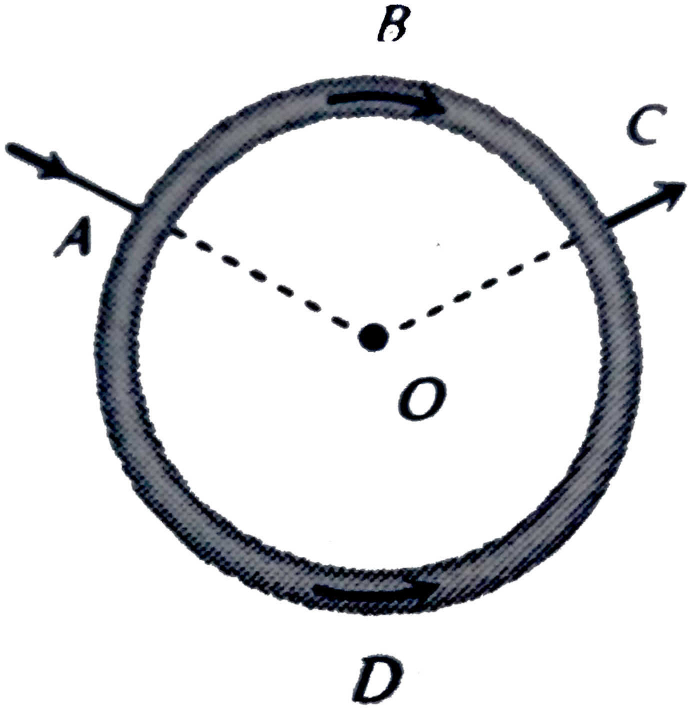
47. A uniform wire is bent in the form of a circle of radius R. A current I enters at A and leaves at C as shown in the figure :

If the length ABC is half of the length ADC, the magnetic field at the centre O will be



A. Zero

B. $\frac{\mu_0 I}{2R}$

C. $\frac{\mu_0 I}{4R}$

D. $\frac{\mu_0 I}{6R}$

Answer: A

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48. The magnetic induction at any point due to a long straight wire carrying a current is

A. Proportional to the distance from the wire

B. Inversely proportional to the distance from wire

C. Inversely proportional to the square of the distance from the wire

D. Does not depend on distance

Answer: B

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49. 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. $\mu_0\frac{N}{L}I$

Answer: D

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50. In a current carrying long solenoid, the field produced does not depend upon

A. Number of turns per unit length

B. Current flowing

C. Radius of the solenoid

D. All of the above three

Answer: C

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

A. $0.56A$

B. $5.6A$

C. $0.28A$

D. $2.8A$

Answer: B

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52. Magnetic field due to $0.1A$ current flowing through a circular coil of radius 0.1m and 1000 turns at the centre of the coil is

A. $2 \times 10^{-1}T$

B. $4.31 \times 10^{-2}T$

C. $6.28 \times 10^{-4}T$

D. $9.81 \times 10^{-4}T$

Answer: C

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53. Magnetic field intensity at the centre of coil of 50 turns, radius $0.5m$ and carrying a current of $2A$ is

A. $0.5 \times 10^{-5} T$

B. $1.25 \times 10^{-4} T$

C. $3 \times 10^{-5} T$

D. $4 \times 10^{-5} T$

Answer: B

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54. If in circular coil of radius R, current I is flowing and in another coil B of radius $2R$ a current $2I$ is flowing , then the raatio of the magnetic fields B_A and B_B, produced by them will be

A. $4:1$

B. $2:1$

C. $3:1$

D. $1:1$

Answer: D

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55. The magnetic field at a distance r from a long wire carryimg current I is 0.4 T. The magnetic field at a distance 2r is

A. 0.2 Tesla

B. 0.8 Tesla

C. 0.1 Tesla

D. 1.6 Tesla

Answer: A

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56. A current I flows along the length of an infinitely long, straight , thin - walled pipe. Then

A. The magnetic field at all points inside the pipe is the same but not zero

B. The magnetic field at any point inside the pipe is zero

C. The magnetic field is zero only on the axis of the pipe

D. The magnetic field is different at different points inside the pipe

Answer: B

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57. The magnetic field at the centre of current carrying coil is

A. $\frac{\mu_0 n i}{2r}$

B. $\frac{\mu_0}{2\pi}\frac{ni}{r}$

C. $\frac{\mu_0 n i}{4r}$

D. $\mu_0 n i$

Answer: A

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58. A straight wire of diameter $0.5mm$ carrying a current of $1A$ is replaced by another wire of $1mm$ diameter carrying the same current. The strength of magnetic field far away is

A. Twice the earlier value

B. Half of the earlier value

C. Quarter of its earlier value

D. Unchanged

Answer: D

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59. A neutral point is obtained at the centre of a vertical circular coil carrying current. The angle between the plane of the coil and the magnetic meridian is

A. 0

B. 45°

C. 60°

D. 90°

Answer: D

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60. One tesla is equal to

A. 10^{7} gauss

B. 10^{-4} gauss

C. 10^{4} gauss

D. 10^{-8} gauss

Answer: C

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61. A current carrying wire in the neighborhood produces

A. No field

B. Electric field only

C. Magnetic field only

D. Electric and magnetic fields

Answer: C

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62. Tesla is a unit for measuring

A. Electric flux

B. Magnetic flux

C. Electric field

D. Magnetic field

Answer: D

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63. The magnetic induction in air at a point $1cm$ away from a long wire that carries a current of $1A$, will be

A. $1 \times 10^{-5}T$

B. $2 \times 10^{-5}T$

C. $3 \times 10^{-5}T$

D. $4 \times 10^{-5}T$

Answer: B

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64. Magnetic field at the centre of coil of n turns, bent in the form of a square of side $2l$, carrying current i, is

A. $\dfrac{\sqrt{2}\mu_0 ni}{\pi l}$

B. $\dfrac{\sqrt{2}\mu_0 ni}{2\pi l}$

C. $\dfrac{\sqrt{2}\mu_0 ni}{4\pi l}$

D. $\dfrac{2\mu_0 ni}{\pi l}$

Answer: A

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65. Which of the following gives the value of magnetic field according to, Biot-Savart's law

A. $\dfrac{i \triangle l \sin\theta}{r^2}$

B. $\frac{\mu_0}{4\pi}\frac{i \triangle l \sin\theta}{r}$

C. $\frac{\mu_0}{4\pi}\frac{i \triangle l \sin\theta}{r^2}$

D. $\frac{\mu_0}{4\pi} i \triangle l \sin\theta$

Answer: C

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66. A toroid has number of turns per unit length n, current i, then the magnetic field is

A. $\mu_0 n i$

B. $\mu_0 n^2 i$

C. $\mu_0 i / n$

D. None of these

Answer: A

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67. Magnetic field due to a ring having n turns at a distance x on its axis is proportional to (if $r =$ radius of ring)

A. $\frac{r}{(x^2 + r^2)}$

B. $\frac{r^2}{(x^2 - r^2)^{3/2}}$

C. $\frac{nr^2}{(x^2 + r^2)^{3/2}}$

D. $\frac{n^2r^2}{(x^2 + r^2)^{3/2}}$

Answer: C

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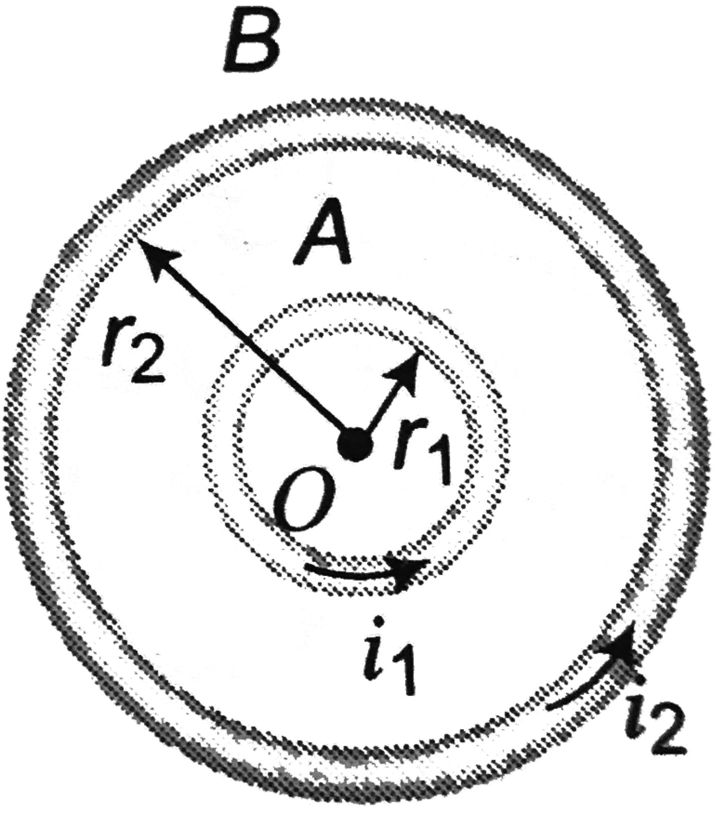
68. A and B are two concentric circular conductors of centre O and carrying currents i_1 and i_2 as shown in the adjacent figure. If ratio of their radii is $1:2$ and ratio of the flux densities at O due to A and B is $1:3$, then the value of i_1 / i_2 is



A. $\frac{1}{6}$

B. $\frac{1}{4}$

C. $\frac{1}{3}$

D. $\frac{1}{2}$

Answer: A

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69. A long straight wire carries an electric current of $2A$. The magnetic induction at a perpendicular distance of $5m$ from the wire is $\left(\mu_0 4\pi \times 10^7 Hm^{-1}\right)$

A. $4 \times 10^{-8} T$

B. $8 \times 10^{-8} T$

C. $12 \times 10^{-8} T$

D. $16 \times 10^{-8} T$

Answer: B

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70. A straight wire carrying a current $10A$ is bent into a semicircular arc of radius $5cm$. The magnitude of magnetic field at the center is

A. $1.5 \times 10^{-5}T$

B. $3.14 \times 10^{-5}T$

C. $6.28 \times 10^{-5}T$

D. $19.6 \times 10^{-5}T$

Answer: C

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71. A long solenoid of length L has a mean diameter D. It has n layers of windings of N turns each. If it carries a current 'i' the magnetic field at its centre will be

A. Proportional to D

B. Inversely proportional to D

C. Independent of D

D. Proportinal to L

Answer: C

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72. A circular loop of radius $0.0157m$ carries a current of 2.0 amp. The magnetic field at the centre of the loop is

$(\mu_0 = 4\pi \times 10^{-7} \text{weber} / amp - m)$

A. 1.57×10^{-5} weber / m^2

B. 8.0×10^{-5} weber / m^2

C. 2.5×10^{-5} weber / m^2

D. 3.14×10^{-5} weber / m^2

Answer: B

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73. A long solenoid has 200 turns per cm and carries a current of 2.5 amps. The magnetic field at its centre is $(\mu_0 = 4\pi \times 10^{-7} \text{weber} / amp - m)$

A. 3.14×10^{-2} weber / m^2

B. 6.28×10^{-2} weber / m^2

C. 9.42×10^{-2} weber / m^2

D. $12.56 \times 10^{-2} \text{weber} / m^2$

Answer: B

Watch Video Solution

74. Two concentric coplanar circular loops of radii r_1 and r_2 carry currents of respectively i_1 and i_2 in opposite direction (one clockwise and the other anticlockwise). The magnetic induction at the centre of the loops is half that due to i_1 alone at the centre. if $r_2 = 2r_1$. the value of i_2 / i_1 is

A. 2

B. $1/2$

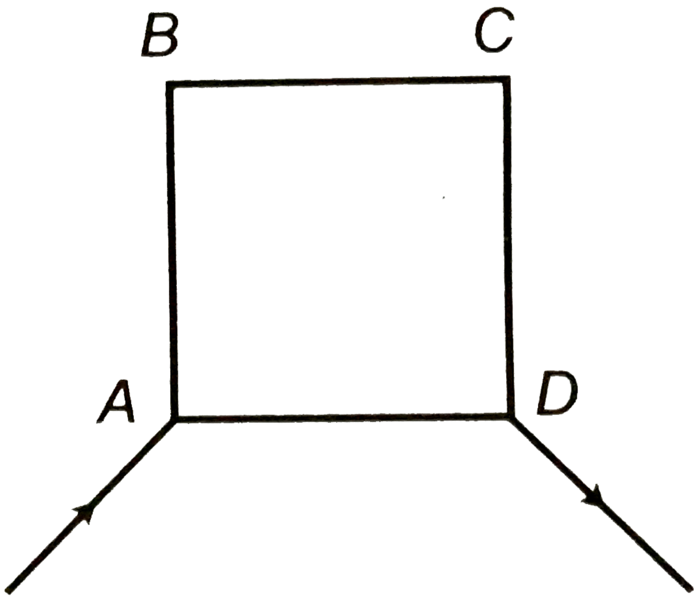
C. $1/4$

D. 1

Answer: D

Watch Video Solution

75. $ABCD$ is a square loop made of a uniform conducting wire. A current enters the loop at A and leaves at D. The magnetic field is



A. Maximum at the centre of the loop

B. Zero at the centre of loop

C. Zero at all points inside the loop

D. Zero at all points outside of the loop

Answer: B

Watch Video Solution

76. Magnetic fields at two points on the axis of a circular coil at a distance of $0.05m$ and $0.2m$ from the centre are in the ratio $8:1$. The radius of the coil is

A. $1.0m$

B. $0.1m$

C. $0.15m$

D. $0.2m$

Answer: B

Watch Video Solution

77. An electric current passes through a long straight wire. At a distance 5 cm from the wire the magnetic field is B. The field at 20 cm from the wire would be

A. $\frac{B}{6}$

B. $\frac{B}{4}$

C. $\frac{B}{3}$

D. $\frac{B}{2}$

Answer: B

Watch Video Solution

78. A closely wound flat circuar coil of 25 turns of wire has diameter of $10cm$ which carries current of $4A$, the flux density at the centre of a coil will be

A. 1.679×10^{-5}tesla

B. 2.028×10^{-4} tesla

C. 1.257×10^{-3}tesla

D. 1.512×10^{-6} tesla

Answer: C

Watch Video Solution

79. The dimension of magnetic field in M, L, T and C (coulomb) is given as

A. $MLT^{-2}A^{-1}$

B. $MT^{-2}A^{-1}$

C. $ML^{2}TA^{-2}$

D. $M^{2}LT^{-2}A^{-1}$

Answer: B

Watch Video Solution

80. A current of 2 amp. flows in a long, straight wire of radius $2mm$. The intensity of magnetic field on the axis of the wire is

A. $\left(\frac{\mu_0}{\pi}\right) \times 10^3$ Tesla

B. $\left(\frac{\mu_0}{2\pi}\right) \times 10^3$ Tesla

C. $\left(\frac{2\mu_0}{\pi}\right) \times 10^3$ Tesla

D. Zero

Answer: D

Watch Video Solution

81. The magnetic field at the centre of a circular coil of radius r carrying current l is B_1. The field at the centre of another coil of radius $2r$ carrying same current l is B_2. The ratio $\frac{B_1}{B_2}$ is

A. $\frac{1}{2}$

B. 1

C. 2

D. 4

Answer: C

Watch Video Solution

82. $1A$ current flows through an infinitely long straight wire. The magnetic field produced at a point 1 metres away from it is

A. 2×10^{-3} Tesla

B. $\frac{2}{10}$ Tesla

C. 2×10^{-7} Tesla

D. $2\pi \times 10^{-6}$ Tesla

Answer: C

Watch Video Solution

83. Two infinitely long parallel wires carry equal current in same direction. The magnetic field at a mid point in between the two wires is

A. Twice the magnetic field produced due to each of the wires

B. Half of the magnetic field produced due to each of the wires

C. Square of the magnetic field produced due to each of the wires

D. Zero

Answer: D

Watch Video Solution

84. A wire in the from of a square of side $'a'$ carries a current i. Then the magnetic induction at the centre of the square wire is (Magnetic permeability of free space=μ_0)

A. $\dfrac{\mu_0 i}{2\pi a}$

B. $\frac{\mu_0 i\sqrt{2}}{\pi a}$

C. $\frac{2\sqrt{2}\mu_0 i}{\pi a}$

D. $\frac{\mu_0 i}{\sqrt{2}\pi a}$

Answer: C

Watch Video Solution

85. An electron moving in a circular orbit of radius r makes n rotation per secound. The magnetic field produced at the centre has magnitude

A. $\frac{\mu_0 \text{ne}}{2r}$

B. $\frac{\mu_0 n^2 e}{2r}$

C. $\frac{\mu_0 \text{ne}}{2\pi r}$

D. Zero

Answer: A

Watch Video Solution

86. A long solenoid has n turns per metre and current IA is flowing through it. The magnetic field induciton at the ends of the solenoid is

A. $\frac{\mu_0 n I}{2}$

B. $\mu_0 n I$

C. Zero

D. $2\mu_0 n I$

Answer: A

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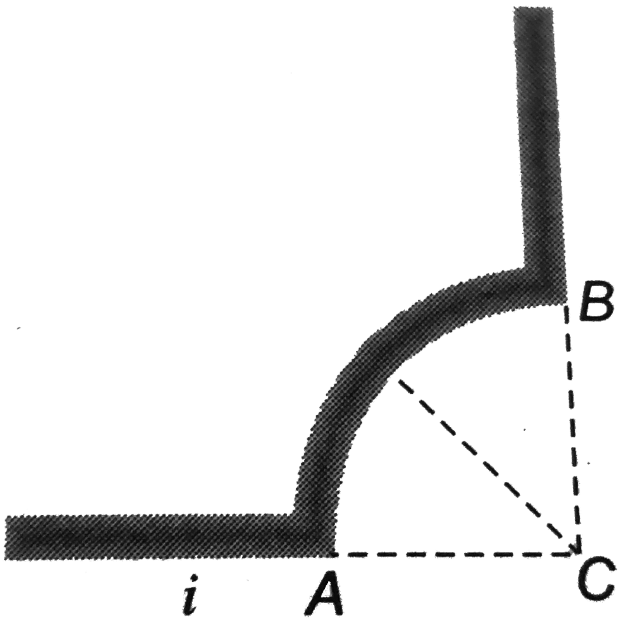
87. A wire carrying current I is shaped as shown. Section AB is a quarter circle of radius r. The magnetic field is directed



A. At an angle $\pi / 4$ to the plane of the paper

B. Perpendicular to the plane of the paper and directed in to the paper

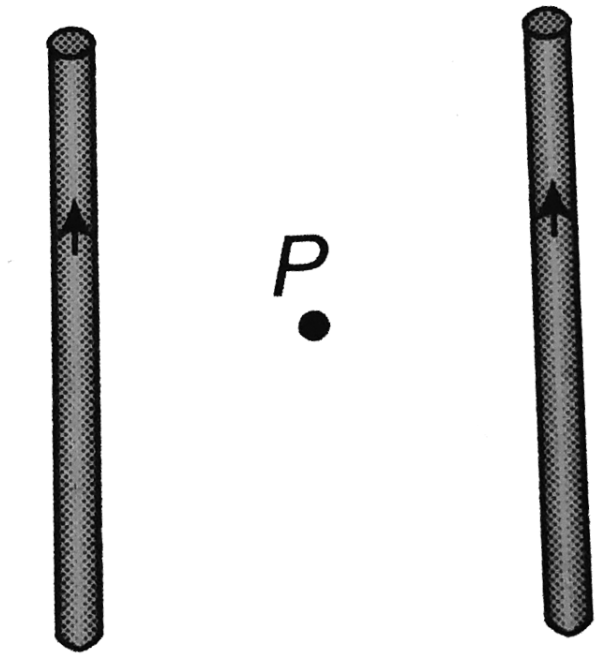
C. Along the bisector of the angle ACB towards AB

D. Along the bisector of the angle ACB away from AB

Answer: B

Watch Video Solution

88. Two long straight wires are set parallel to each other. Each carriers a current i in the same direction and the separation between them is $2r$. The intensity of the magnetic field midway between them is



A. $\mu_0 i / r$

B. $4\mu_0 i / r$

C. Zero

D. $\mu_0 / 4r$

Answer: C

Watch Video Solution

89. A magnetic field can be produced by

A. A moving charge

B. A changing electric field

C. None of these

D. Both of these

Answer: D

Watch Video Solution

90. Which of the following is a unit of permeability ?

A. Amp/metre

B. Amp/m^2

C. Henry

D. Henry/metre

Answer: D

Watch Video Solution

91. A long straight wire carries a current of πamp. The magnetic field due to it will be $5 \times 10^{-5} \text{weber} / m^2$ at what distance from the wire [$\mu_0 =$ permeability of air]

A. $10^4 \mu_0$ metre

B. $\frac{10^4}{\mu_0}$ metre

C. $10^6 \mu_0$ metre

D. $\frac{10^6}{\mu_0}$ metre

Answer: A

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92. When a certain length of wire is turned into one circular loop, the magnetic induction at the centre of coil due to some current flowing is B_1 If the same wire is turned into three loops to make a circular coil, the magnetic induction at the center of this coil for the same current will be

A. B_1

B. $9B_1$

C. $3B_1$

D. $27B_1$

Answer: B

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93. Gauss is unit of which quantity

A. H

B. B

C. ϕ

D. 1

Answer: B

Watch Video Solution

94. On connecting a battery to the two corners of a diagonal of a square conductor frame of side a the magnitude of the magnetic field at the centre will be

A. Zero

B. $\frac{\mu_0}{\pi a}$

C. $\frac{2\mu_0}{\pi a}$

D. $\frac{4\mu_0 i}{\pi a}$

Answer: A

Watch Video Solution

95. The ratio of the magnetic field at the centre of a current carrying coil of the radius a and at distance $'a'$ from centre of the coil and perpendicular to the axis of coil is

A. $\frac{1}{\sqrt{2}}$

B. $\sqrt{2}$

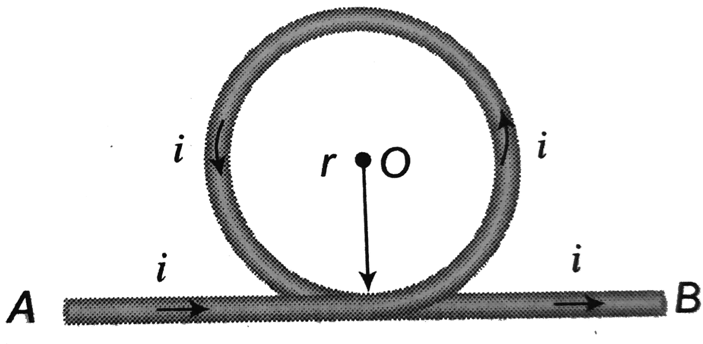
C. $\frac{1}{2\sqrt{2}}$

D. $2\sqrt{2}$

Answer: D

Watch Video Solution

96. A part of a long wire carrying a current i is bent into a circle of radius r as shown in figure. The net magnetic field at the centre O of the circular loop is



A. $\dfrac{\mu_0 i}{4r}$

B. $\dfrac{\mu_0 i}{2r}$

C. $\frac{\mu_0 i}{2\pi r}(\pi + 1)$

D. $\frac{\mu_0 i}{2\pi r}(\pi - 1)$

Answer: C

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97. The core of a toroid having $3000 turns$ has inner and outer radii of $11 cm$ and $12 cm$ respectively. The magnetic field in the core for a current of $0 \cdot 70 A$ is $2 \cdot 5 T$. Calculate relative permeability of the core?

A. 100

B. 200

C. 300

D. 400

Answer: D

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98. The magnetic field near a current carrying conductor is given by

A. Coulomb's law

B. Lenz' law

C. Biot-savart's law

D. Kirchoff's law

Answer: C

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99. A wire in the from of a circular loop of one turn carrying a current produces a magnetic fild B at the centre. If the same wire is looped into a coil of two turns and carreis the same current, the new value of magnetic induction at the centre is

A. $5B$

B. $3B$

C. $2B$

D. $4B$

Answer: D

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100. A long solenoid carrying a current produces a magnetic field B along its axis. If the current is doubled and the number of turns per cm is halved, the new value of the magnetic field is

A. B

B. $2B$

C. $4B$

D. $B/2$

Answer: A

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101. A long straight wire carrying current of $30A$ is placed in an external uniform magnetic field of induction $4 \times 10^{4}T$. The magnetic field is acting parallel to the direction of current. The magnetic of the resultant magnetic induction in tesla at a point $2.0cm$ away form the wire is

A. 10^{-4}

B. 3×10^{-4}

C. 5×10^{-4}

D. 6×10^{-4}

Answer: C

Watch Video Solution

102. The earth's magnetic field at a given point is $0.5 \times 10^{-5} Wb - m^{-2}$. This field is to be annulled by magnetic indcution at the centre of a circular conducting loop of radius $5.0 cm$. The current required to be flown in the loop is nearly

A. $0.2A$

B. $0.4A$

C. $4A$

D. $40A$

Answer: B

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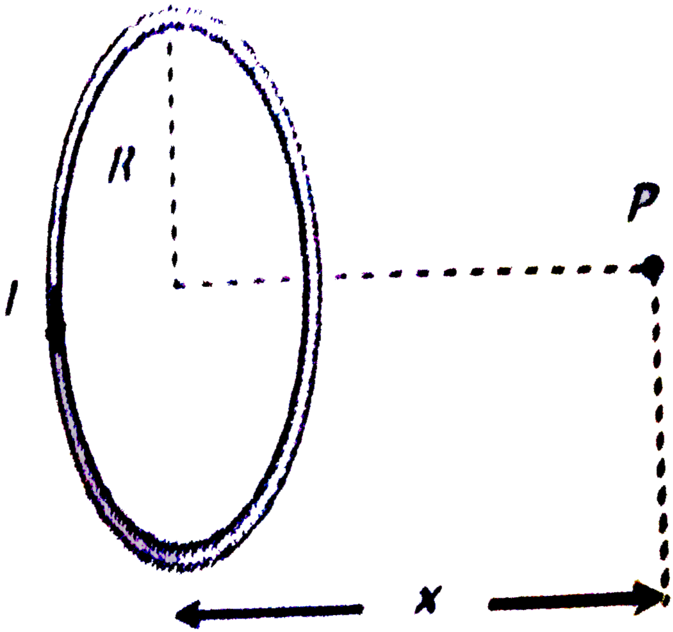
103. A coil having N turns carry a current I as shown in the figure. The magnetic field intensity at point P is



A. $\dfrac{\mu_0 NIR^2}{2(R^2 + x^2)^{3/2}}$

B. $\dfrac{\mu_0 NI}{2R}$

C. $\dfrac{\mu_0 NIR^2}{(R + x)^2}$

D. Zero

Answer: A

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104. Two similar coils are kept mutually perpendicular such that their centres coincide. At the centre, find the ratio of the magnetic field due to one coil and the resultant magnetic field by both coils, if the same current is flown

A. $1:\sqrt{2}$

B. $1:2$

C. $2:1$

D. $\sqrt{3}:1$

Answer: A

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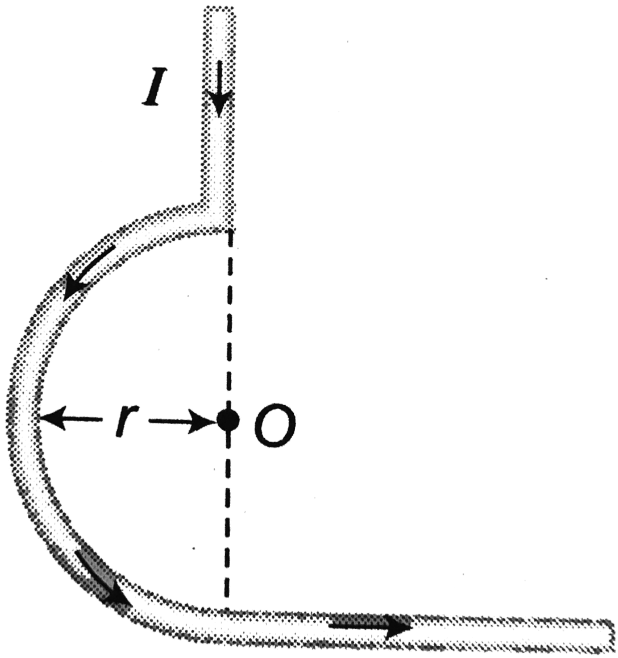
105. In the figure, what is the magnetic field at the point O?



A. $\dfrac{\mu_0 I}{4\pi r}$

B. $\dfrac{\mu_0 I}{4\pi r} + \dfrac{\mu_0 I}{2\pi r}$

C. $\dfrac{\mu_0 I}{4r} + \dfrac{\mu_0 I}{4\pi r}$

D. $\dfrac{\mu_0 I}{4r} - \dfrac{\mu_0 I}{4\pi r}$

Answer: C

Watch Video Solution

106. The magnetic dipole moment of a current loop, carrying current I, having n turns, each of radius r is...................... .

A. $1/r$

B. $1/r$

C. r

D. r

Answer: D

Watch Video Solution

107. A current flows in a conductor from east to west. The direction of the magnetic field at a points above the conductor is

A. Towards north

B. Towards south

C. Towards east

D. Towards west

Answer: A

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108. A long wire carries a steady curent . It is bent into a circle of one turn and the magnetic field at the centre of the coil is B. It is then bent into a circular loop of n turns. The magnetic field at the centre of the coil will be

A. nB

B. nB

C. $2nB$

D. $2nB$

Answer: B

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109. The magnetic field due to a current carrying loop of radius $3cm$ at a point on the axis at a distance of $4cm$ from the centre is $54\mu T$. What will be its value at the centre of loop ?

A. $250\mu T$

B. $150\mu T$

C. $125\mu T$

D. $75\mu T$

Answer: A

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110. The current is flowing in south direction along a power line. The direction of magnetic field above the power line (neglecting earth's field) is

A. South

B. East

C. North

D. West

Answer: D

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111. Two wires of same length are shaped into a square and a circle. If they carry same current, ratio of the magnetic moment is

A. $2 : \pi$

B. $\pi : 2$

C. $\pi : 4$

D. $4 : \pi$

Answer: C

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112. An electron is revolving round a proton, producing a magnetic field of $16 weber / m^2$ in a circular orbit of radius `1 Å. Its angular velocity will be

A. $10^{17} rad/\sec$

B. $1/2\pi \times 10^{12} rad/\sec$

C. $2\pi \times 10^{12} rad/\sec$

D. $4\pi \times 10^{12} rad/\sec$

Answer: A

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113. Two concentric coils each of radius equal to $2\pi cm$ are placed at right angles to each other $3 ampere$ and $4 ampere$ are the currents flowing in each coil respectively. The magnetic induction in $weber/m^2$ at the centre of the coils will be

$(\mu_0 = 4\pi \times 10^{-7} Wb/A.m)$

A. 5×10^{-5}

B. 7×10^{-5}

C. 12×10^{-5}

D. 10^{-5}

Answer: A

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114. A wire carrying current I and other carrying $2I$ in the sam direction produce a magnetic field B at the midpoint. What will be the field when $2I$ wire is swiched off?

A. $B/2$

B. $2B$

C. B

D. $4B$

Answer: C

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115. Two long parallel wires P and Q are both perpendicular to the plane of the paper with distance $5m$ between them. If P and Q carry current of 2.5 amp and 5 amp respectively in the same direction, then the magnetic field at a point half way between the wires is

A. $\frac{\sqrt{3}\mu_0}{2\pi}$

B. $\frac{\mu_0}{\pi}$

C. $\frac{3\mu_0}{2\pi}$

D. $\frac{\mu_0}{2\pi}$

Answer: D

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116. The direction of magnetic field lines due to straight conductor carrying current is given by.................... .

A. Lenz's law

B. Fleming's left hand rule

C. Right hand palm rule

D. Maxwell's law

Answer: C

Watch Video Solution

117. For the magnetic field to be maximum due to a small element of current carrying conductor at a point, the angle between the element and the line joining the element to the given point must be

A. 0°

B. 90°

C. 180°

D. 45°

Answer: B

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118. A proton moving with a constant velocity passes through a region of space without any changing its velocity. If E and B represent the electric and magnetic fields, respectively. Then, this region of space may have

A. $E = 0, B = 0$

B. $E = 0, B \neq 0$

C. $E \neq 0, B = 0$

D. $E \neq 0, B \neq 0$

Answer: D

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119. A uniform magnetic field and a uniform electric field are produced, pointing in the same direction. An electron is projected with its velocity pointed in the same direction. What will be the effect on electron?

A. The electron will turn to its right

B. The electron will turn to its left

C. The electron velocity will increase in magnitude

D. The electron velocity will decrease in magnitude

Answer: D

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120. 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 paths of radii R_1 and R_2, respectively. The ratio of masses of X and 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. $\frac{R_1}{R_2}$

Answer: C

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121. A beam of ions with velocity $2 \times 10^5 ms^{-1}$ enters normally into a uniform magnetic field of $0 \cdot 04$ tesla. If the specific charge of ion is $5 \times 10^7 Ckg^{-1}$, find the radius of the circular path described.

A. $0.10m$

B. $0.16m$

C. $0.20m$

D. $0.25m$

Answer: A

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122. The radius of curvature of the path of the charged particle in a uniform magnetic field is directly proportional to

A. The charge on the particle

B. The momentum of the particle

C. The energy of the particle

D. The intensity of the field

Answer: B

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123. An electron has mass $9 \times 10^{-31} kg$ and change $1.6 \times 10^{-19} C$ is moving with a velocity of $10^{6} m/s$, enters a region where magnetic field exists. If it describes a circle of radius $0.10m$, the intensity of magnetic field must be

A. $1.8 \times 10^{-4} T$

B. $5.6 \times 10^{-5} T$

C. $14.4 \times 10^{-5} T$

D. $1.3 \times 10^{-6} T$

Answer: B

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124. A proton (mass m and charge $+e$) and an α-particle (mass 4 m and charge $+2e$) are projected with the same kinetic energy at right angles to the uniform magnetic field. Which one of the following statements will be true?

A. The α- particle will be bent in a circular path with a small radius that for the proton

B. The radius of the path of the $\alpha -$ particle will be greater than that of the proton

C. The $\alpha -$ particle and the proton will be bent in a circular path with the same radius

D. The $\alpha -$ particle and the proton will go through the field in a straight line

Answer: C

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125. A charged particle moving in a magnetic field experiences a resultant force

A. In the direction of field

B. In the direction opposite to that field

C. In the direction perpendicular to both the field and its velocity

D. None of these

Answer: C

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126. If the direction of the initial velocity of a charged particle is neither along nor perpendicular to that of the magnetic field, then the orbit will be

A. A straight line

B. An ellipse

C. A circle

D. A helix

Answer: C

Watch Video Solution

127. If the direction of the initial velocity of a charged particle is neither along nor perpendicular to that of the magnetic field, then the orbit will be

A. A straight line

B. An ellipse

C. A circle

D. A helix

Answer: D

Watch Video Solution

128. Particles having positive charges occasionally come with high velocity from the sky towards the earth. On account of the magnetic field of earth, they would be deflected towards the

A. North

B. South

C. East

D. West

Answer: C

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129. A $2MeV$ proton is moving perpendicular to a uniform magnetic field 2.5 tesla. The force on the proton is

A. $2.5 \times 10^{-10} N$

B. $7.6 \times 10^{-11} N$

C. $2.5 \times 10^{-11} N$

D. $7.6 \times 10^{-12} N$

Answer: D

Watch Video Solution

130. A charged particle moves with velocity v in a uniform magnetic field $\overrightarrow{B}$. The magnetic force experienced by the particle is

A. Always Zero

B. Never zero

C. Zero, if $\overrightarrow{B}$ and $\overrightarrow{v}$ are perpendicular

D. Zero, if $\overrightarrow{B}$ and $\overrightarrow{v}$ are parallel

Answer: D

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131. A proton is moving along Z-axis in a magnetic field. The magnetic field is along X-axis. The proton will experience a force along

A. X -axis

B. Y-axis

C. Z-axis

D. Negative Z-axis

Answer: B

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132. A proton of mass m and charge $+e$ is moving in a circular orbit in a magnetic field with energy $1MeV$. What should be the energy of alpha-particle (mass=$4m$ and charge=$+2e$), so that it can revolve in the path of same radius?

A. $1MeV$

B. $4MeV$

C. $2MeV$

D. $0.5MeV$

Answer: A

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133. An electron is moving with a speed of $10^8 m/\sec$ perpendicular to a uniform magnetic field to intensity B. Suddenly intensity of the magnetic field is reduced to $B/2$. The radius of the path becomes from the original value of r

A. No change

B. Reduces to $r/2$

C. Increases to $2r$

D. Stops moving

Answer: C

Watch Video Solution

134. A proton and an $\alpha -$ particle enter a uniform magnetic field moving with the same speed. If the proton takes $25\mu s$ to make 5 revolutions, then the periodic time for the $\alpha -$ particle would be

A. $50\mu \sec$

B. $25\mu \sec$

C. $10\mu \sec$

D. $5\mu \sec$

Answer: C

Watch Video Solution

135. A proton $\left(mass = 1.67 \times 10^{-27} kg\right.$ and charge $\left.1.6 \times 10^{-19} C\right)$ enters perpendicular to a magentic field of intensity $2weber/m^2$ with a speed of $2.6 \times 10^7 m/\sec$. The acceleration of the proton should be

A. $6.5 \times 10^{15} m/\sec^2$

B. $6.5 \times 10^{13} m/\sec^2$

C. $6.5 \times 10^{11} m/\sec^2$

D. $6.5 \times 10^{9} m/\sec^2$

Answer: A

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136. An α particle travels in a circular path of radius $0.45m$ in a magnetic field $B = 1.2Wb/m^2$ with a speed of $2.6 \times 10^7 m/\sec$. The α particle is

A. $1.1 \times 10^{-5} \sec$

B. 1.1×10^{-6} sec

C. 1.1×10^{-7} sec

D. 1.1×10^{-8} sec

Answer: C

Watch Video Solution

137. A unifrom magnetic field B is acting from south to north and is of magntitdue $1.5 Wb/m^2$. If a proton having mass $= 1.7 \times 10^{-27} kg$ and charge $= 1.6 \times 10^{-19} C$ moves in this field vertically downwards with energy $5 MeV$, then the force acting on it will be

A. $7.4 \times 10^{12} N$

B. $7.4 \times 10^{-12} N$

C. $7.4 \times 10^{19} N$

D. $7.4 \times 10^{-19} N$

Answer: B

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138. A strong magnetic field is applied on a stationary electron, then

A. The electron moves in the direction of the field

B. The electron moves in an opposite direction

C. The electron remains stationary

D. The electron starts spinning

Answer: C

Watch Video Solution

139. A uniform magnetic field acts right angles to the direction of motion of electrones. As a result, the electron moves in acircular path of radius 2 cm. If the speed of electrons is doubled, then the radius of the circular path will be

A. $2.0cm$

B. $0.35cm$

C. $4.0cm$

D. $1.0cm$

Answer: C

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140. A deutron of kinetic energy 50 keV is describing a circular orbit of radius 0.5 meter in a plane perpendicular to magnetic field $\overrightarrow{B}$. The kinetic energy of the proton that describes a circular orbit of radius 0.5 meter in the same plane with the same $\overrightarrow{B}$ is

A. $258keV$

B. $50keV$

C. $200keV$

D. $100keV$

Answer: D

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141. If a proton is projected in a direction perpendicular to a uniform magnetic field with velocity v and and electron is projected along the line of force, what will happen to proton and electron?

A. The electron will travel along a circle with constant speed and the proton will move along a straight line

B. Proton will move in a circle with constant speed and there will be no effect on the motion of electron

C. There will not be any effect on the motion of electron and proton

D. The electron and proton both will follow the path of a parabola

Answer: B

Watch Video Solution

142. An electron is travelling horizontally towards east. A magnetic field in vertically downward direction exerts a force on the electron along

A. East

B. West

C. North

D. South

Answer: D

Watch Video Solution

143. Lorentz force can be calculated by using the formula.

A. $\vec{F} = q\left(\vec{E} + \vec{v} \times \vec{B}\right)$

B. $\vec{F} = q\left(\vec{E} - \vec{v} \times \vec{B}\right)$

C. $\vec{F} = q\left(\vec{E} + \vec{v} . \vec{B}\right)$

D. $\vec{F} = q\left(\vec{E} \times \vec{B} + \vec{v}\right)$

Answer: A

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144. A magnetic field

A. Always exerts a force on a charged particle

B. Never exerts a force on a charged particle

C. Exerts a force, if the charged particle is moving across the magnetic field lines

D. Exerts a force, if the charged particle is moving along the magnetic field lines

Answer: C

Watch Video Solution

145. A proton enters a magnetic fiedl of flux density $1.5\text{weber}/m^2$ with a velocity of $2 \times 10^{-7} m/\sec$ at an angle of 30° with the field. The force on the proton will be

A. $2.4 \times 10^{-12} N$

B. $0.24 \times 10^{-12} N$

C. $24 \times 10^{-12} N$

D. $0.02 \times 10^{-12} N$

Answer: A

Watch Video Solution

146. If a particle of charge 10^{-12} coulomb moving along the$\widehat{x}$-direction with a velocity $10^5 m/s$ experiences a force of 10^{-10} newton in $\hat{y}$-direction due to magnetic field. Then the minimum magnetic field is

A. 6.25×10^3 tesla in $\hat{z}$- direction

B. 10^{-15} tesla in $\hat{z}$- direction

C. 6.25×10^{-3} tesla in $\hat{z}$- direction

D. 10^{-3} tesla in $\hat{z}$- direction

Answer: D

Watch Video Solution

147. A proton, a deuteron and an α particle are accelerated through same potential difference and then they enter a normal uniform magnetic field, the ratio of their kinetic energies will be

A. $1:2:2$

B. $2:2:1$

C. $1:2:1$

D. $1:1:2$

Answer: D

Watch Video Solution

148. Which of the following statement is true

A. The presence of a large magnetic flux through a coil maintains a current in the coil if the circuit is continuous

B. A coil of a metal wire kept stationary in a non-uniform magnetic field has an e.m.f. induced in it

C. charged particle enters a region of uniform magnetic field at an angle of 85° to the magnetic lines of force, the path of the particle is a circle

D. There is no change in the energy of a charged particle moving in a magnetic field although a magnetic force is acting on it

Answer: D

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149. 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_3 may be less than or greater than r_p depending on the direction of the magnetic field

Answer: B

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150. A proton of mass $1.67 \times 10^{-27} kg$ and charge $1.6 \times 10^{-19} c$ is projected with a speed of $2 \times 10^{6} m/s$ at an angle of 60° to the x-axis. If a uniform magnetic field of 0.104 Tesla is applied along Y-axis, the path of proton is

A. A circle of radius $= 0.2m$ and time period $\pi \times 10^{-7} s$

B. A circle of radius $= 0.1m$ and time period $2\pi \times 10^{-7} s$

C. A circle of radius $= 0.1m$ and time period $2\pi \times 10^{-7} s$

D. A helix of radius $= 0.2m$ and time period $4\pi \times 10^{-7} s$

Answer: C

Watch Video Solution

151. A proton and a deuteron both having the same kinetic energy, enter perpendicularly into a uniform magnetic field B.

For motion of proton and deuteron on circular path or radius R_p and R_d respectively, the correct statement is

A. $R_d = \sqrt{2} R_p$

B. $R_d = R_p / \sqrt{2}$

C. $R_d = R_p$

D. $R_d = 2R_p$

Answer: A

Watch Video Solution

152. A proton (or charged particle) moving with velocity v is acted upon by electric field E and magnetic field B. The proton will move undeflected if

A. E is perpendicular to B

B. E is parallel to v and perpendicular to B

C. E, B and v are mutually perpendicular and $v = \frac{E}{B}$

D. E and B both are parallel to v

Answer: C

Watch Video Solution

153. A proton and an electron both moving with the same velocity v enter into a region of magnetic field directed perpendicular to the velocity of the particles. They will now move in cirular orbits such that

A. Their time periods will be same

B. The time period for proton will be higher

C. The time period for electron will be higher

D. Their orbital radii will be same

Answer: B

Watch Video Solution

154. A charge $+Q$ is moving upwards vertically. It enters a magnetic field directed to the north. The force on the charge will be towards

A. North

B. South

C. East

D. West

Answer: D

Watch Video Solution

Watch Video Solution

155. An electron is moving on a circular path of radius r with speed v in a transverse magnetic field B. e/m for it will be

A. $\frac{v}{Br}$

B. $\frac{B}{rv}$

C. Bvr

D. $\frac{vr}{B}$

Answer: A

Watch Video Solution

156. A beam of well collimated cathode rays travelling with a speed of $5 \times 10^6 ms^{-1}$ enter a region of mutually perpendicular electric and magnetic fields and emerge undeviated from this region. If $|B| = 0.02t$, the magnitude of the electric field is

A. $10^5 Vm^{-1}$

B. $2.5 \times 10^8 Vm^{-1}$

C. $1.25 \times 10^{10} Vm^{-1}$

D. $2 \times 10^3 Vm^{-1}$

Answer: A

Watch Video Solution

157. An electron having charge $1.6 \times 10^{-19} C$ and mass 9×10^{-31} kg is moving with $4 \times 10^6 ms^{-1}$ speed in a magnetic field 2×10^{-1} tesla in circular orbit. The force acting on electron and the radius of the circular orbit will be

A. $12.8 \times 10^{-13} N, 1.1 \times 10^{-4} m$

B. $1.28 \times 10^{-14} N, 1.1 \times 10^{-3} m$

C. $1.28 \times 10^{-13} N, 1.1 \times 10^{-3} m$

D. $1.28 \times 10^{-13} N, 1.1 \times 10^{-4} m$

Answer: D

Watch Video Solution

158. An electron entres a magnetic field whose direction is perpendicualr to the velocity of the electron. Then

A. The speed of the electron will increase

B. The speed of the electron will decrease

C. The speed of the electron will remain the same

D. The velocity of the electron will remain the same

Answer: C

Watch Video Solution

159. An electron is moving vertically downwards. If it passes through a magnetic field which is directed from south to north in a horizontal plane, then in which direction the electron would be deflected?

A. East

B. West

C. North

D. South

Answer: A

Watch Video Solution

160. A current carrying long solenoid is placed on the ground with its axis vertical. A proton is falling along the axis of the solenoid with a velocity v. When the proton enters into the solenoid, it will

A. Be deflected from its path

B. Be accelerated along the same path

C. Be decelerated along the same path

D. Move along the same path with no change in velocity

Answer: D

Watch Video Solution

161. A charged particle of charge q and mass m enters perpendicularly in a magnetic field B. Kinetic energy of particle E, then frequency of rotation is

A. $\frac{Bq}{2\pi m}$

B. $\frac{Bq}{2\pi rm}$

C. $\frac{2\pi m}{Bq}$

D. $\frac{Bm}{2\pi q}$

Answer: A

Watch Video Solution

162. An electron is accelerated by a potential difference of 12000 volts. It then enters a uniform magnetic field of $10^{-3}T$ applied perpendicular to the path of electron. Find the radius of path.

Given mass of electron $= 9 \times 10^{-31} kg$ and charge on electron $= 1.6 \times 10^{-19} C$

A. $36.7m$

B. $36.7m$

C. $3.67m$

D. $3.67m$

Answer: B

Watch Video Solution

163. The charge on a particle Y is double the charge on particle X.These two particles X and Y after being accelerated through the same potential difference enter a region of uniform magnetic field and describe circular paths of radii R_1 and R_2 respectively. The ratio of the mass of X to that of Y is

A. $\left(\frac{2R_1}{R_2}\right)^2$

B. $\left(\frac{R_1}{2R_2}\right)^2$

C. $\frac{R_1^2}{2R_2^2}$

D. $\frac{2R_1}{R_2}$

Answer: C

Watch Video Solution

164. A particle with 10^{-11} coulomb of charge and $10^{-7} kg$ mass is moving wilth a velocity of $10^8 m/s$ along the y-axis. A uniform static magnetic field $B = 0.5$ Tesla is acting along the x-direction. The force on the particle is

A. $5 \times 10^{-11} N$ along $\hat{i}$

B. $5 \times 10^3 N$ along $\hat{k}$

C. $5 \times 10^{-11} N$ along $-\hat{j}$

D. $5 \times 10^{-4} N$ along $-\hat{k}$

Answer: D

Watch Video Solution

165. A particle of charge q and mass m moving with a velocity v along the x-axis enters the region $x > 0$ with uniform magnetic field B along the $\hat{k}$ direction. The particle will penetrate in this region in the x-direction upto a distance d equal to

A. Zero

B. $\frac{mv}{qB}$

C. $\frac{2mv}{qB}$

D. Infinity

Answer: B

Watch Video Solution

166. A charged particle is moving with velocity $'V'$ in a magnetic field of induction B. The force on the paricle will be maximum when

A. v and B are in the same direction

B. v and B are in opposite directions

C. v and B are perpendicular

D. v and B are at angle of 45°

Answer: C

Watch Video Solution

167. A charged particle enters a magnetic field H with its initial velocity making an angle of 45° with H. The path of the particle will be

A. A straight line

B. A circle

C. An ellipse

D. A helix

Answer: D

Watch Video Solution

168. An electron and a proton enter a magnetic field perpendicularly. Both have same kinetic energy. Which of the following is true

A. Trajectory of electron is less curved

B. Trajectory of proton is less curved

C. Both trajectories are equally curved

D. Both move on straight-line path

Answer: B

Watch Video Solution

169. A charged particle moves in a uniform magnetic field. The velocity of the particle at some instant makes an acute angle with the magnetic field. The path of the particle will be

A. A straight line

B. A circle

C. A helix with uniform pitch

D. A helix with non-uniform pitch

Answer: C

Watch Video Solution

170. An electron is moving along positive x-axis. To get it moving on an anticlockwise circular path in x-y plane, a magnetic field is applied

A. Along positive y-axis

B. Along positive z-axis

C. Along negative y-axis

D. Along negative z-axis

Answer: B

Watch Video Solution

171. A moving charge will gain energy due to the application of

A. Electric field

B. Magnetic field

C. Both of these

D. None of these

Answer: A

Watch Video Solution

172. A proton, a deuteron and an α- particle having the same kinetic energy are moving in circular trajectors in a constant magnetic field. If r_p, r_d and r_α denote respectively the radii of the trajectories of these particles then

A. $r_\alpha = r_p < r_d$

B. $r_\alpha > r_d > r_p$

C. $r_\alpha = r_d > r_p$

D. $r_p = r_d = r_\alpha$

Answer: A

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173. A charge moves in a circle perpendicular to a magnetic field. The time period of revolution is independent of

A. Magnetic fieldMagnetic field

B. Charge

C. Mass of the particle

D. Velocity of the particle

Answer: D

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174. A proton of energy $200 MeV$ enters the magnetic field of $5T$. If direction of field is from south to north and motion is upward, the force acting on it will be

A. Zero

B. $1.6 \times 10^{-10} N$

C. $3.2 \times 10^{-8} N$

D. $1.6 \times 10^{-6} N$

Answer: B

Watch Video Solution

175. An electron enters a region where magnetic field (B) and electric field (E) are mutually perpendicular, then

A. It will always move in the direction of B

B. It will always move in the direction of E

C. It always possess circular motion

D. It can go undeflected also

Answer: D

Watch Video Solution

176. A charge moving with velocity v in X-direction is subjected to a field of magnetic induction in the negative X-direction. As a result, the charge will

A. Remain unaffected

B. Start moving in a circular path $Y-Z$ plane

C. Retard along X-axis

D. Move along a helical path around X- axis

Answer: A

Watch Video Solution

177. An electron and a proton with equal momentum enter perpendicularly into a uniform magnetic field, then

A. The path of proton shall be more curved than that of electron

B. The path of proton shall be less curved than that of electron

C. Both are equally curved

D. Path of both will be straight line

Answer: C

Watch Video Solution

178. A positively charged particle moving due east enters a region of uniform magnetic field directed vertically upwards. The partical will be

A. Get deflected vertically upwards

B. Move in a circular orbit with its speed increased

C. Move in a circular orbit with its speed unchanged

D. Continue to move due east

Answer: C

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179. 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

Answer: B

Watch Video Solution

180. A particle is moving in a uniform magnetic field, then

A. Its momentum changes but total energy remains the same

B. Both momentum and total energy remain the same

C. Both will change

D. Total energy changes but momentum remains the same

Answer: A

Watch Video Solution

181. If an electron is going in the direction of magnetic field $\overrightarrow{B}$ with the velocity of $\overrightarrow{v}$ then the force on electron is

A. Zero

B. $e\left(\overrightarrow{v}.\overrightarrow{B}\right)$

C. $e\left(\overrightarrow{v}\times\overrightarrow{B}\right)$

D. None of these

Answer: A

Watch Video Solution

182. One proton beam enters a magnetic field of $10^{-4}T$ normally. Specific charge $=10^{11}C/kg$. Velocity $=10^{7}m/s$. What is the radius of the circle described by it

A. $0.1m$

B. $1m$

C. $10m$

D. None of these

Answer: B

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183. In a cyclotron, the angular frequency of a charged particle is vindependent of

A. Mass

B. Speed

C. Charge

D. Magnetic field

Answer: B

Watch Video Solution

184. A charged particle is moving in a uniform magnetic field in a circular path. Radius of circular path is R. When energy of particle is doubled, then new radius will be

A. $R\sqrt{2}$

B. $R\sqrt{3}$

C. $2R$

D. $3R$

Answer: A

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185. The radius of curvature of the path of a charged particle moving in a static uniform magnetic field is

A. Directly proportional to the magnitude of the charge on the particle

B. Directly proportional to the magnitude of the linear momentum of the particle

C. Directly proportional to the kinetic energy of the particle

D. Inversely proportional to the magnitude of the magnetic field

Answer: B::D

Watch Video Solution

186. A proton moving withh a velocity $2.5 \times 10^7 m/s$ enters a magnetic field of intensity $2.5T$ making an angle 30° with the magnetic field. The force on the proton is

A. $3 \times 10^{-12} N$

B. $5 \times 10^{-12} N$

C. $6 \times 10^{-12} N$

D. $9 \times 10^{-12} N$

Answer: B

Watch Video Solution

187. Maximum kinetic energy of the positive ion in the cyclotron is

A. $\frac{q^2 B r_0}{2m}$

B. $\frac{q B^2 R_0}{2m}$

C. $\frac{q^2 B^2 r_0^2}{2m}$

D. $\frac{q B r_0}{2m^2}$

Answer: C

Watch Video Solution

188. A charge q is moving in a magnetic field then the magnetic force does not depend upon

A. Charge

B. Mass

C. Velocity

D. Magnetic field

Answer: B

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189. An electron is travelling in east direction and a magnetic field is applied in upward direction then electron will deflect in

A. South

B. North

C. West

D. East

Answer: B

Watch Video Solution

190. 1 charge of $1C$ in a magnetic field of 0.5 Tesla with a velocity of $10m/\sec$ Perpendicular to the field. Force experienced is

A. $5N$

B. $10N$

C. $0.5N$

D. $0N$

Answer: A

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191. An electron of mass m and charge q is travelling with a speed v along a circular path of radius r at right angles to a uniform of magnetic field B. If speed of the electron is doubled and the magnetic field is halved, then resulting path would have a radius of

A. $\frac{r}{4}$

B. $\frac{r}{2}$

C. $2r$

D. $4r$

Answer: D

Watch Video Solution

192. 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 to its right

B. The electron will turn to its left

C. The velocity of the electron will increase

D. The velocity of the electron will remain unchanged

Answer: D

Watch Video Solution

193. A particle of mass m and charge q enters a magnetic field B perpendicularly with a velocity v, The radius of the circular path described by it will be

A. Bq/mv

B. mq/Bv

C. mB/qv

D. mv/Bq

Answer: D

Watch Video Solution

194. An electron moving towards the east enters a magnetic field directed towards the north. The force on the electron will be directed

A. Vertically upward

B. Vertically downward

C. Towards the west

D. Towards the south

Answer: B

Watch Video Solution

195. An electron (mass $= 9.0 \times 10^{-31}$ kg and charge $= 1.6 \times 10^{-19}$ coulomb) is moving in a circular orbit in a magnetic field of $1.0 \times 10^{-4} \text{weber} / m^2$. Its perido of revolution is

A. 3.5×10^{-7} sec

B. 7.0×10^{-7} sec

C. 1.05×10^{-6} sec

D. 2.1×10^{-6} sec

Answer: A

Watch Video Solution

196. An electron (charge q coulomb) enters a magnetic field of $H \text{weber} / m^2$ with a velocity of vm / s in the same direction as that of the field the force on the electron is

A. Hqv Newton's in the direction of the magnetic field

B. Hqv dynes in the direction of the magnetic field

C. Hqv Newton's at right angles to the direction of the magnetic field

D. Zero

Answer: D

Watch Video Solution

197. A homogeneous electric field E and a uniform magnetic field $\overrightarrow{B}$ are pointing in the same direction. A proton is projected with its velocity parallel to $\overrightarrow{E}$. It will

A. Go on moving in the same direction with increasing velocity

B. Go on moving in the same direction with constant velocity

C. Turn to its right

D. Turn to its left

Answer: A

Watch Video Solution

198. The radius of circular path of an electron when subjected to a perpendicular magnetic field is

A. $\frac{mv}{Be}$

B. $\frac{me}{Be}$

C. $\frac{mE}{Be}$

D. $\frac{Be}{mv}$

Answer: A

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199. Cyclotron is used to accelerate

A. Electrons

B. Neutrons

C. Positive ions

D. Negative ions

Answer: C

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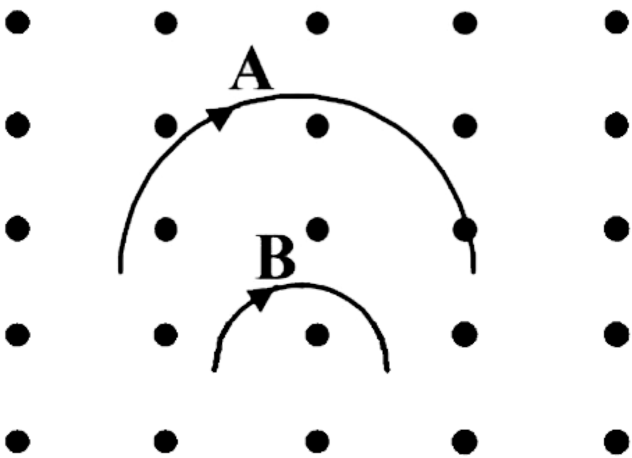
200. Two particles A and B of masses m_A and m_B respectively and having the same charge are moving in a plane . The speeds of the particles are v_A and v_B respectively and the trajectories are as shown in the figure. Then



A. $m_A v_A < m_B v_B$

B. $m_A v_A > m_B v_B$

C. $m_A < m_B$ and $v_A < v_B$

D. $m_A = m_B$ and $v_A = v_B$

Answer: B

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201. A proton and an alpha particle are separately projected in a region where a uniform magnetic field exists. Their initial velocities are perpendicular to direction of magnetic field. If both the particles move around magnetic field in circles of equal radii, the ratio of momentum of proton to alpha particle $\left(\frac{p_p}{p_\alpha}\right)$ is

A. 1

B. $\frac{1}{2}$

C. 2

D. $\frac{1}{4}$

Answer: B

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202. A particle of mass $0.6g$ and having charge of $25n_C$ is moving horizontally with a uniform velocity $1.2 \times 10^4 ms^{-1}$ in a uniform magnetic field, then the value of the magnetic induction is $(g = 10ms^{-2})$

A. Zero

B. $10t$

C. $20T$

D. $200T$

Answer: C

Watch Video Solution

203. An α particle and a proton travel with same velocity in a magnetic field perpendicular to the direction of their veloccites find the ratio of the radii of their circular path

A. $4:1$

B. $1:4$

C. $2:1$

D. $1:2$

Answer: C

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204. Motion of a moving electron is not affected by

A. An electric field applied in the direction of motion

B. Magnetic field applied in the direction of motion

C. Electric field applied perpendicular to the direction of motion

D. Magnetic field applied perpendicular to the direction of motion

Answer: B

Watch Video Solution

205. When a charged particle enters a uniform magnetic field its kinetic energy

A. Remains constant

B. Increases

C. Decreases

D. Becomes zero

Answer: A

Watch Video Solution

206. Cathode rays enter into a unifrom magnetic field perpendicular to the direction of the field. In the magnetic field their path will be

A. Ellipse

B. Circle

C. Parabola

D. None of these

Answer: B

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207. At a specific instant emission of radioactive compound is deflected in a magnetic field . The compound can emit

(i) electron (ii)protons(iii)He^{2+}(iv) neutrons

The emission at instant can be

A. i,ii,iii

B. i,ii,iii,iv

C. iv

D. ii,iii

Answer: A

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208. Which of the follwing particles will have minimum frequency of revolution when projected with the same velocity perpendicular to a magnetic field?

A. Li

B. Electron

C. Proton

D. He^{+}

Answer: A

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209. Mixed He^{+} and O^{2+} ions (mass of He^{+}=4 amu and that of $O^{2+} = 16$ amu) beam passes a region of constant perpendicular magnetic field. If kinetic energy of all the ions is same then

A. He^{+} ions will be deflected more than tose of O^{2+}

B. He^{+} ions will be deflected less than those of O^{2+}

C. All the ions will be deflected equally

D. No ions will be deflected

Answer: C

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210. An electron (mass $= 9 \times 10^{-31} kg$. Charge $= 1.6 \times 10^{-19} C)$ whose kinetic energy is 7.2×10^{-18} joule is moving in a circular orbit in a magnetic field of $9 \times 10^{-5} \text{weber} / m$. The radius of the orbit is

A. $1.25 cm$

B. $2.5 cm$

C. $12.5 cm$

D. $25.0cm$

Answer: D

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211. An electron enters a region where electrostatic field is $20N/C$ and magnetic field is $5T$. If electron passes undeflected through the region, then velocity of electron will be

A. $0.25ms^{-1}$

B. $2ms^{-1}$

C. $4ms^{-1}$

D. $8ms^{-1}$

Answer: C

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Watch Video Solution

212. In a region, steady and uniform electric and magnetic fields are present . These two fields are parallel to each other. A charged particle is released from rest in this region . The path of the particle will be a

A. Straight line

B. Circle

C. Helix

D. Cycloid

Answer: A

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213. A particle of mass M and charge Q moving with velocity $\vec{v}$ describe a circular path of radius R when subjected to a uniform transverse magnetic field of induction B. The work done by the field when the particle completes one full circle is

A. $BQv2\pi R$

B. $\left(\frac{Mv^2}{R}\right)2\pi R$

C. Zero

D. $BQ2\pi R$

Answer: C

Watch Video Solution

214. A particle of charge 16×10^{-18} coulomb moving with velocity $10m/s$ along the $x-$ axis enters a region where a magnetic field of induction B is along the $y-$ axis, and an electric field of magnitude $10/m^{-1}$ is along the negative $Z-$ axis. If the charged particle continues moving along the $X-$ axis, the magnitude to B is

A. $10^{-3}Wb/m^2$

B. $10^3Wb/m^2$

C. $10^5Wb/m^2$

D. $10^{16}Wb/m^2$

Answer: B

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215. Two ions having masses in the ratio $1:1$ and charges $1:2$ are projected into uniform magnetic field perpendicular to the field with speeds in th ratio $2:3$. The ratio of the radius of circular paths along which the two particles move is

A. $4:3$

B. $2:3$

C. $3:1$

D. $1:4$

Answer: A

Watch Video Solution

216. An electron is travelling along the x-direction. It encounters a magnetic field in the y-direction. Its subsequent motion wil be

A. Straight line along the x-direction

B. A circle in the xz-plane

C. A circle in the yz-plane

D. A circle in the xy-plane

Answer: B

Watch Video Solution

217. An electron and a proton have equal kinetic energies. They enter in a magnetic field perpendicularly, Then

A. Both will follow a circular path with same radius

B. Both will follow a helical path

C. Both will follow a parabolic path

D. All the statements are false

Answer: D

Watch Video Solution

218. Electrons move at right angles to a magnetic field of 1.5×10^{-2} Tesla with a speed of $6 \times 10^{7} m / s$. If the specific charge of the electron is $1.7 \times 10^{11} C / kg$. The radius of the circular path will be

A. $2.9 cm$

B. $3.9 cm$

C. $2.35 cm$

D. $3 cm$

Answer: C

Watch Video Solution

219. The cyclotron frequency of an electron gyrating in a magnetic field of $1T$ is approximately:

A. $28MHz$

B. $280MHz$

C. $2.8GHz$

D. $28GHz$

Answer: D

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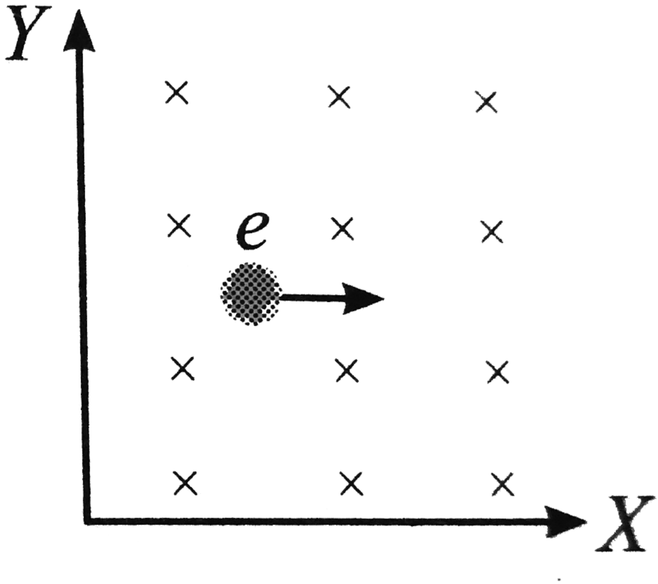
220. In the given figure, the electron enters into the magnetic feld. It enters into the magnetic field. It deflects in....... Direction



A. $+ve X$ direction

B. $-ve X$ direction

C. $+ve Y$ direction

D. $-ve Y$ direction

Answer: D

Watch Video Solution

221. A proton of energy $8eV$ is moving in a circular path in a uniform magnetic field. The energy of an alpha particle moving in the same magnetic field and along the same path will be

A. $4eV$

B. $2eV$

C. $8eV$

D. $6eV$

Answer: C

Watch Video Solution

222. An electron, a proton, a deuteron and an alpha particle, each having the same speed are in a region of constant magnetic field perpendicular to the direction of the velocities of the particles. The radius of the circular orbits of these particles are respectively R_e, R_p, R_d and R_α It follows that

A. $R_e = R_p$

B. $R_p = R_d$

C. $R_d = R_\alpha$

D. $R_p = R_\alpha$

Answer: C

Watch Video Solution

223. An electron moving with a uniform velocity along the positive x-direction enters a magnetic field directed along the positive y-direction. The force on the electron is directed along

A. Positive $y-$ direction

B. Negative y-direction

C. Positive z- direction

D. Negative z-direction

Answer: D

Watch Video Solution

224. An electron is projected along the axis of a circular conductor carrying some current. Electron will experience force

A. Along the axis

B. Perpendicular to the axis

C. At an angle of 4o with axis

D. No force experienced

Answer: D

Watch Video Solution

225. A very high magnetic field is applied to a stationary charge. Then the charge experiences

A. A force in the direction of magnetic field

B. A force perpendicular to the magnetic field

C. A force in an arbitrary direction

D. No force

Answer: D

Watch Video Solution

226. An electron $(q = 1.6 \times 10^{-19} C)$ is moving at right angles to a uniform magnetic field of 3.534×10^{-5} T The time taken by the electron to complete a circular orbit is

A. $2\mu s$

B. $4\mu s$

C. $3\mu s$

D. $1\mu s$

Answer: D

Watch Video Solution

227. In case Hall effect for a strip having charge Q and area of crosssection A, the Lorentz force is

A. Directly proportional to Q

B. Inversely proportional to Q

C. Inversely proportional to A

D. Directly proportional to A

Answer: A

Watch Video Solution

228. A charged particle of mass m and charge q travels on a circular path of radius r that is perpendicular to a magnetic field B. The time takeen by the particle to complete one revolution is

A. $\frac{2\pi qB}{m}$

B. $\frac{2\pi m}{qB}$

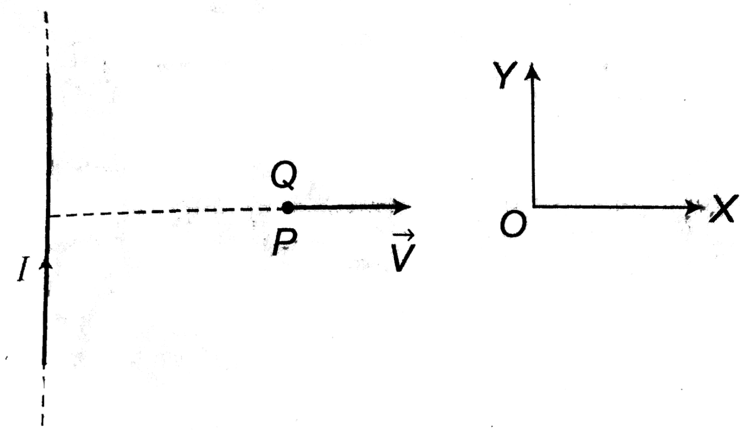
C. $\frac{2\pi mq}{B}$

D. $\frac{2\pi q^2 B}{m}$

Answer: B

Watch Video Solution

229. A very long straight wire carries a current I. At the instant when a charge $+Q$ at point P has velocity $\overrightarrow{V}$, as shown, the force on the charge is



A. Opposite to OX

B. Along OX

C. Opposite to OY

D. Along OY

Answer: D

Watch Video Solution

230. The electron in the beam of a television tube move horizontally from south to north. The vertical component of the earth's magnetic field points down. The electron is deflected towards.

A. West

B. No deflection

C. East

D. North to south

Answer: C

Watch Video Solution

231. An electron moves in a circular orbit with a uniform speed v .It produces a magnetic field B at the centre of the circle. The radius of the circle is proportional to

A. $\frac{B}{v}$

B. $\frac{v}{R}$

C. $\sqrt{\frac{v}{B}}$

D. $\sqrt{\frac{B}{v}}$

Answer: C

Watch Video Solution

232. An electric field of 1500 V/m and a magnetic field of 0.40 Wb/m^2 act on a moving electron. The minimum uniform speed along a straight line, the electron could have is

A. $1.6 \times 10^{15} m / s$

B. $6 \times 10^{-16} m / s$

C. $3.75 \times 10^{3} m / s$

D. $3.75 \times 10^{2} m / s$

Answer: C

Watch Video Solution

233. 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 $3.2x10^5 \frac{V}{m}$, and a magnetic fields of $2.0 \times 10^{-3} W \frac{b}{m^2}$. 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

A. $45m$

B. $4.5m$

C. $0.45m$

D. $0.045m$

Answer: C

Watch Video Solution

234. An electron, moving in a uniform magnetic field of induction of intensity $\vec{B}$ has its radius directly proportional to

A. Its charge

B. Magnetic field

C. Speed

D. None of these

Answer: C

Watch Video Solution

235. Two free paralell wires carrying currents in opposite direction

A. Attract each other

B. Repel each other

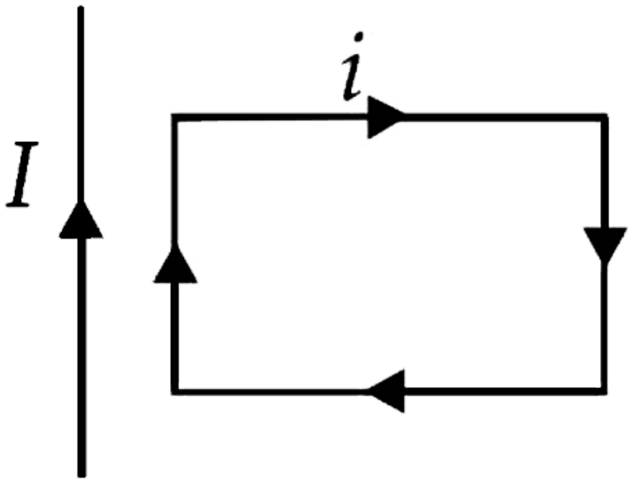
C. Neither attract nor repel

D. Get rotated to be perpendicular to each other

Answer: B

Watch Video Solution

236. 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 steady current I is established in the wire as shown in the figure ,



A. Rotate about an axis parallel to the wire

B. Move away from the wire or towards right

C. Move towards the wire

D. Remain stationary

Answer: C

Watch Video Solution

237. A circular coil of radius $4cm$ and of 20 turns carries a current of 3 amperes. It is placed in a magnetic field of intensity of $0.5weber/m^2$. The magnetic dipole moment of the coil is

A. 0.15 ampere- m^2

B. 0.3 ampere $-m^2$

C. 0.45 ampere $-m^2$

D. 0.6 ampere $-m^2$

Answer: B

Watch Video Solution

238. A conducting circular loop of radiius r carries a constant current i. It is placed in a uniform magnetic field $\vec{B}_0$ such that

$\overrightarrow{B}_0$ is perpendicular to the plane of the loop . The magnetic force acting on the loop is

A. $ir\overrightarrow{B}$

B. $2\pi ri\overrightarrow{B}$

C. Zero

D. $\pi ri\overrightarrow{B}$

Answer: C

Watch Video Solution

239. Two thin long parallel wires seperated by a distance 'b' are carrying a current ' I' amp each . The magnitude of the force3 per unit length exerted by one wire on the other is

A. $\frac{\mu_0 i^2}{b^2}$

B. $\frac{\mu_0 i^2}{2\pi b}$

C. $\frac{\mu_0 i}{2\pi b}$

D. $\frac{\mu_0 i}{2\pi b^2}$

Answer: B

Watch Video Solution

240. Currents of $10A$, $2A$ are passed through two parallel wires A and B respectively in opposite directions. If the wire A is infinitely long and the length of the wire B is 2 metre, the force on the conductor B, which is situated at $10cm$ distance from A will be

A. $8 \times 10^{-5} N$

B. $4 \times 10^{-7} N$

C. $4 \times 10^{-5} N$

D. $4\pi \times 10^{-7} N$

Answer: A

Watch Video Solution

241. Two streams of electrons are moving parallel to each other in the same direction. They

A. Do not exert any force on each other

B. Repel each other

C. Attract each other

D. Get rotated to be perpendicular to each other

Answer: B

Watch Video Solution

242. A straight wire carrying a cureent i_1 amp runs along the axis of a circular current i_2 amp. Then the force of interaction between the two current carrying conductors is

A. ∞

B. Zero at the centre of loop

C. $\frac{\mu_0}{4\pi}\frac{2i_1i_2}{r}N/m$

D. $\frac{2i_1i_2}{r}N/m$

Answer: B

Watch Video Solution

243. Two parallel wires are carrying electric currents of equal magnitude and in the same direction. They excert

A. An attractive force on each other

B. A repulsive force on each other

C. No force on each other

D. A rotational torque on each other

Answer: A

Watch Video Solution

244. Two long and parallel wires are at a distance of $0.1m$ and a current of $5A$ is flowing in each of these wires. The force per unit length due to these wires will be

A. $5 \times 10^{-5} N/m$

B. $5 \times 10^{-3} N/m$

C. $2.5 \times 10^{-5} N/m$

D. $2.5 \times 10^{-4} N/m$

Answer: A

Watch Video Solution

245. Two straight parallel wires, both carrying 10 ampere in the same direction attract each other with a force of $1 \times 10^{-3} N$. If both currents are doubled, the force of attraction will be

A. $1 \times 10^{-3} N$

B. $2 \times 10^{-3} N$

C. $4 \times 10^{-3} N$

D. $0.25 \times 10^{-3} N$

Answer: C

Watch Video Solution

246. A circular coil of radius 4 cm has 50 turns. In this coil a current of $2A$ is flowing. It is placed in a magnetic field of $0.1 \text{weber} / m^2$. The amount of work done is rotation it through 180° from its equilibrium position will be

A. $0.1J$

B. $0.2J$

C. $0.4J$

D. $0.8J$

Answer: A

Watch Video Solution

247. $3A$ of current is flowing in a linear conductor having a length of $40cm$. The conductor is placed in a magnetic field of strength 500 gauss and makes an angle of 30° with the direction of the field. It experiences a force of magnitude

A. 3×10^{4} newton

B. 3×10^{2} newton

C. 3×10^{-2} newton

D. 3×10^{-4} newton

Answer: C

Watch Video Solution

248. The radius of a circular loop is r and a current i is flowing in it. The equivalent magnetic moment will be

A. ir

B. $2\pi ir$

C. $i\pi r^2$

D. $\frac{1}{r^2}$

Answer: C

Watch Video Solution

249. 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 of the loop

C. Value of the current

D. Magnetic field

Answer: A

Watch Video Solution

250. To make the field radial in a moving coil galvanometer

A. The number of turns in the coil is increased

B. Magnet is taken in the form of horse-shoe

C. Poles are cylindrically cut

D. Coil is wounded on aluminium frame

Answer: C

Watch Video Solution

251. The deflection in a moving coil galvanometer is

A. Directly proportional to the torsional constant

B. Directly proportional to the number of turns in the coil

C. Inversely proportional to the area of the coil

D. Inversely proportional to the current flowing

Answer: B

Watch Video Solution

252. In a moving coil galvanometer, the deflection of the coil q is related to the electrical current i by the relation

A. $i \propto \tan\theta$

B. $i \propto \theta$

C. $i \propto \theta^2$

D. $i \propto \sqrt{\theta}$

Answer: B

Watch Video Solution

253. The unit of electric current "ampere" is the current which when flowing through each of two parallel wires spaced $1m$ apart in vacuum and of infinite length will give rise to a force between them equal to

A. $1N/m$

B. $2 \times 10^{-7} N/m$

C. $1 \times 10^{-2} N/m$

D. $4\pi \times 10^{-7} N/m$

Answer: B

Watch Video Solution

254. A moving coil galvanometer has N numbr of turns in a coil of effective area A, it carries a current I. The magnetic field B is radial. The torque acting on the coil is

A. NA^2B^2I

B. $NABI^2$

C. N^2ABI

D. $NABI$

Answer: D

Watch Video Solution

255. A small coil of N turns has an effective area A and carries a current I. It is suspended in a horizontal magnetic field $\overrightarrow{B}$ such that its plane is perpendicular to $\overrightarrow{B}$. The work done in rotating it by 180° about the vertical axis is

A. $NAlB$

B. $2NAlB$

C. $2\pi NAIB$

D. $4\pi NAIB$

Answer: B

Watch Video Solution

256. A small coil of N turns has area A and a current I flows through it. The magnetic dipole moment of this coil will be

A. NI/A

B. NI^2A

C. N^2AI

D. NlA

Answer: D

Watch Video Solution

257. A current of 10 ampere is flowing in a wire of length $1.5m$. A force of $15N$ acts on it when it is placed in a uniform magnetic field of 2 tesla. The angle between the magnetic field and the direction of the current is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: A

Watch Video Solution

258. A rectangular loop carrying a current i is placed in a uniform magnetic field B. The area enclosed by the loop is A. If there are n turns in the loop, the torque acting on the loop is given by

A. $ni\vec{A}\times\vec{B}$

B. $ni\overrightarrow{A}.\overrightarrow{B}$

C. $\frac{1}{n}\left(i\overrightarrow{A}\times\overrightarrow{B}\right)$

D. $\frac{1}{n}\left(i\overrightarrow{A}.\overrightarrow{B}\right)$

Answer: A

Watch Video Solution

259. An electron moves with a constant speed v along a circle of radius r. Its magnetic moment will be (e is the electron's charge)

A. evr

B. $\frac{1}{2}evr$

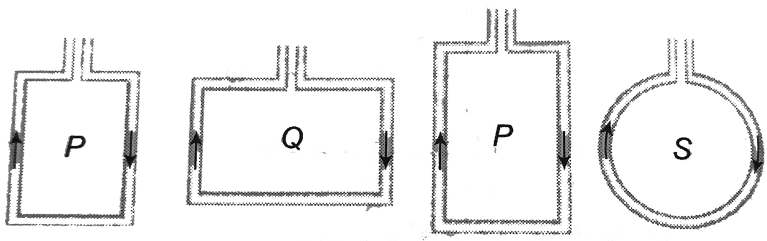
C. $\pi r^2 ev$

D. $2\pi rev$

Answer: B

Watch Video Solution

260. Four wires each of length 2.0 meters area bent into four loops P, Q, R and S and then suspended into uniform magnetic field. Same current is passed in each loop. Which statement is correct?



A. Couple on loop P will be the highest

B. Couple on loop Q will be the highest

C. Couple on loop R will be the highest

D. Couple on loop S will be the highest

Answer: D

Watch Video Solution

261. A current carrying rectangular coil is placed in a uniform magnetic field. In which orientation, the coil will not tend to rotate

A. The magnetic field is parallel to the plane of the coil

B. The magnetic field is perpendicular to the plane of the coil

C. The magnetic field is at 45° with the plane of the coil

D. Always in any orientation

Answer: B

Watch Video Solution

262. A current carrying circular loop is freely suspended by a long thread. The plane of the loop will point in the direction

A. Wherever left free

B. North-south

C. East-west

D. At 45° with the east-west direction

Answer: C

Watch Video Solution

263. A current carrying loop is free to turn in a uniform magnetic field.The loop will then come into equilibrium when its plane is inclined at

A. 0° to the direction of the field

B. 45° to the direction of the field

C. 90° to the direction of the field

D. 135° to the direction of the field

Answer: C

Watch Video Solution

264. The expression for the torque acting on a coil having area of crosssection A, number of turns n, placed in a magnetic field of strength B, making an angle θ with the normal to the plane of the coil, when a current i is flowing in it, will be

A. $niAB\tan\theta$

B. $niAB\cos\theta$

C. $niAB\sin\theta$

D. $niAB$

Answer: C

Watch Video Solution

265. The sensitiveness of a moving coil galvanometer can be increased by decreasing

A. The number of turns in the coil

B. The area of the coil

C. The magnetic field

D. The couple per unit twist of the suspension

Answer: D

Watch Video Solution

266. Two parallel conductors A and B of equal lengths carry currents I and $10I$, respectively, in the same direction. Then

A. A and B will repel each other with same force

B. A and B will attract each other with same force

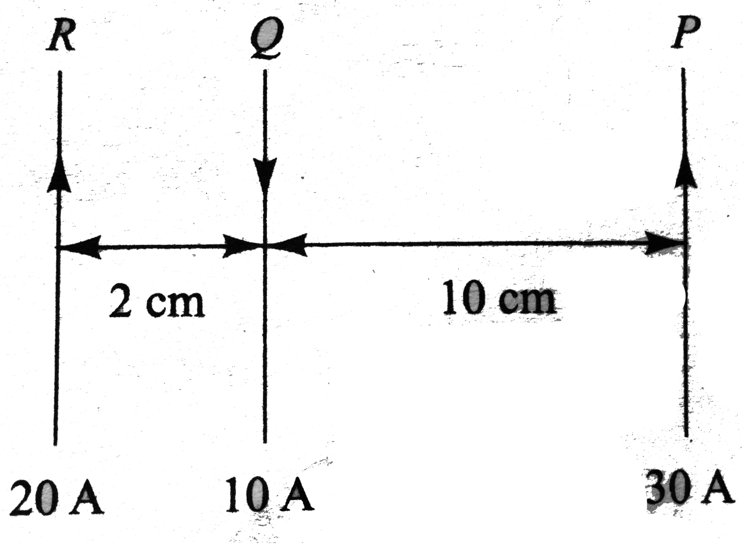
C. A will attract B, but B will repel A

D. A and B will attract each other with different forces

Answer: B

Watch Video Solution

267. Three long, straight and parallel wires are arranged as shown in Fig. The forces experienced by 10 cm length of wire Q is



A. $1.4 \times 10^{-4} N$ towardes the right

B. $1.4 \times 10^{-4} N$ towards the left

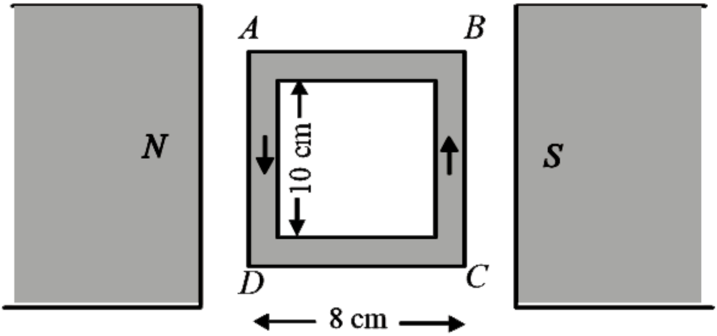
C. $2.6 \times 10^{-4} N$ to the right

D. $2.6 \times 10^{-4} N$ to the left

Answer: A

Watch Video Solution

268. A 100 turns coil shown in figure carries a current of 2 amp in a magnetic field $B = 0.2 Wb/m^2$. The torque acting on the coil is



A. $0.32 Nm$ tending to rotate the side AD out of the page

B. $0.32 Nm$ tending to rotate the side AD into the page

C. $0.0032 Nm$ tending to rotate the side AD out of the page

D. $0.0032 Nm$ tending to rotate the side AD into the page

Answer: A

Watch Video Solution

269. A current of 5 ampere is flowing in a wire of length 1.5 metres. A force of $7.5N$ acts on it when it is placed in a uniform magnetic field of 2 Tesla. The angle between the magnetic field and the direction of the current is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: A

Watch Video Solution

270. A conductor in the form of a right angle ABC with $AB = 3cm$ and $BC = 4cm$ carries a current of $10A$.There is a uniform magnetic field of $5T$ perpendicular to the palne of the conductor. The force on the conductor will be

A. $1.5N$

B. $2.0N$

C. $2.5N$

D. $3.5N$

Answer: C

Watch Video Solution

271. The coild of a galvanometer consists of 100 turn and effective area $1cm^2$. The restoring couple is $10^{-8}n-m/rad.$ The magnetic field between the pole pieces 5 tesla. The current sensitivty per micro ampere.

A. $5 \times 10^4 rad / \mu amp$

B. 5×10^{-6} per amp

C. 2×10^{-7} per amp

D. $5 rad / \mu amp$

Answer: D

Watch Video Solution

272. A rectangular coil $20cm \times 20cm$ has 100 turns and carries a current of $1A$. It is placed in a uniform magnetic field $B = 0.5T$ with the direction of magnetic field parallel to the plane of the coil. The magnitude of the torque required to hold this coil in this position is

A. Zero

B. $200N - m$

C. $2N - m$

D. $10N - m$

Answer: C

Watch Video Solution

273. If a current is passed through a spring then the spring will

A. Gets compressed

B. Gets expanded

C. Oscillates

D. Remains unchanged

Answer: A

Watch Video Solution

274. A current carrying small loop behaves like a small magnet. If A be its area and M its magnetic moment, the current in the loop will be

A. M/A

B. A/M

C. MA

D. A^2M

Answer: A

Watch Video Solution

275. In hydrogen atom, the electron is making $6.6 \times 10^{15} rev/\sec$ around the nucleus in an orbit of radius $0.528A$. The magnetic moment `(A-m^(2)) will be

A. 1×10^{-23}

B. 1×10^{-10}

C. 1×10^{-23}

D. 1×10^{-27}

Answer: C

Watch Video Solution

276. A triangular loop of side l carries a current I. It is placed in a magnetic field B such that the plane of the loop is in the direction of B. The torque on the loop is

A. Zero

B. lBl

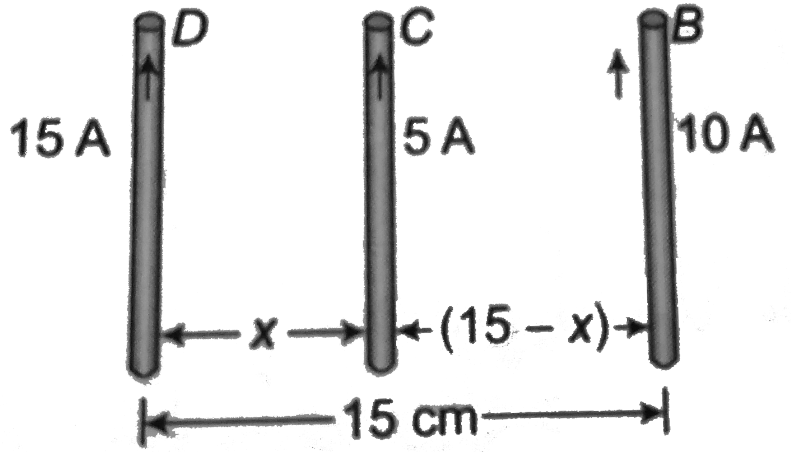
C. $\frac{\sqrt{3}}{2} Il^2 B^2$

D. $\frac{\sqrt{3}}{4} IBl^2$

Answer: D

Watch Video Solution

277. Three long straight and parallel wires carrying currents are arranged as shown in the figure. The wire C which carreis a current of $5.0 amp$ is so placed that it experiences no force. The distance of wire C from D is then



A. $9cm$

B. $7cm$

C. $5cm$

D. $3cm$

Answer: A

Watch Video Solution

278. A vertical wire carrying a current in the upward direction is placed in horizontal magnetic field directed towards north. The wire will experience a force directed towards

A. North

B. South

C. East

D. West

Answer: D

Watch Video Solution

279. A coil carrying electric current is placed in uniform magnetic field

A. Torque is formed

B. E.M.f. is induced

C. Both (a) and (b) are correct

D. None of these

Answer: A

Watch Video Solution

280. A circular loop carrying a current is replaced by an equivalent magnetic dipole. A point on the axis of the loop is in

A. An end-on position

B. A broad side-on position

C. Both (a) and (b)

D. Neither (a) nor (b)

Answer: A

Watch Video Solution

281. A power line lies along the east-west direction and carries a current of 10 ampere. The force per metre due to the earth's magnetic field of 10^{-4} tesla is

A. $10^{-5}N$

B. $10^{-4}N$

C. $10^{-3}N$

D. $10^{-2}N$

Answer: C

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282. A straight wire of length 0.5 metre and carrying a current of 1.2 ampere is placed in a uniform magnetic field of induction 2 tesla. If the magnetic field is perpendicular to the length of the wire , the force acting on the wire is

A. $2.4N$

B. $1.2N$

C. $3.0N$

D. $2.0N$

Answer: B

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283. Two parallel wires in free spaces are $10cm$ apart and each carries a current of $10A$ in the same direction. The force one wire exerts on the other per metre of length is

A. $2 \times 10^{-4} N$ attractive

B. $2 \times 10^{-4} N$, repulsive

C. $2 \times 10^{-7} N$ attractive

D. $2 \times 10^{-7} N$, repulsive

Answer: A

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284. The current sensitivity of a moving coil galvanometer can be increased by

A. Increasing the magnetic field of the permanent magnet

B. Increasing the area of the deflecting coil

C. Increasing the number of turns in the coil

D. Increasing the restoring couple of the coil

Answer: A::B::C

Watch Video Solution

285. A circular coil of diameter $7cm$ has 24 turns of wire carrying current of $0.75A$. The magnetic moment of the coil is

A. $6.9 \times 10^{-2} amp - m^2$

B. $2.3 \times 10^{-2} amp - m^2$

C. $10^{-2} amp - m^2$

D. $10^{-3} amp - m^2$

Answer: A

Watch Video Solution

286. Two long parallel wires carrying equal current separated by $1m$, exert a force of `2xx10^(-7)N//m on one another. The current flowing through them is

A. $2.0A$

B. $2.0 \times 10^{-7}A$

C. $1.0A$

D. $1.0 \times 10^{-7}A$

Answer: C

Watch Video Solution

287. Two parallel beams of electrons moving in the same direction produce a mutual force

A. Of attraction in plane of paper

B. Of repulsion in plane of paper

C. Upwards perpendicular to plane of paper

D. Downwards perpendicular to plane of paper

Answer: B

Watch Video Solution

288. A circular loop of area $0.01m^2$ carrying a current of $10A$, is held perpendicular to a magnetic field of intensity $0.1T$. The torque acting on the loop is

A. Zero

B. $0.01N - m$

C. $0.001N - m$

D. $0.8N - m$

Answer: A

Watch Video Solution

289. Magnetic dipole moment of rectangular loop is

A. Inversely proportional to current in loop

B. Inversely proportional to area of loop

C. Parallel to plane of loop and proportional to area of loop

D. Perpendicular to plane of loop and proportional to area of loop

Answer: D

Watch Video Solution

290. If m is magnetic moment and B is the magnetic field, then the torque is given by

A. $\overrightarrow{m}.\overrightarrow{B}$

B. $\frac{\left|\overrightarrow{m}\right|}{\left|\overrightarrow{B}\right|}$

C. $\overrightarrow{m}\times\overrightarrow{B}$

D. $\left|\overrightarrow{m}\right|.\left|\overrightarrow{B}\right|$

Answer: C

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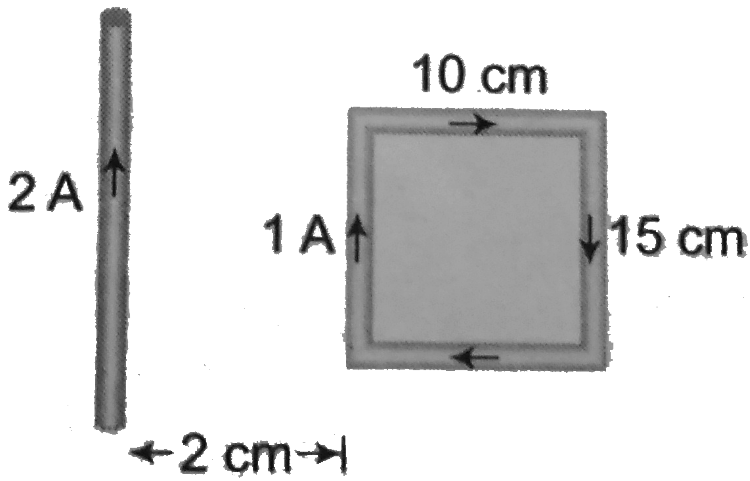
291. What is the net force on the square coil?



A. $25 \times 10^{-7} N$ moving towards wire

B. $25 \times 10^{-7} N$ moving away from wire

C. $35 \times 10^{-7} N$ moving towards wire

D. $35 \times 10^{-7} N$ moving away from wire

Answer: A

Watch Video Solution

292. Two long parallel copper wires carry currents of $5A$ each in opposite directions. If the wires are separated by a distance of $0.5m$, then the force between the two wires is

A. $10^{-5}N$, atrractive

B. $10^{-5}N$, repulsive

C. $2 \times 10^{-5}N$, attractive

D. $2 \times 10^{-5}N$, repulsive

Answer: B

Watch Video Solution

293. In order to increase the sensitivity of a moving coil galvanometer, one should decrease

A. The strength of its magn

B. The torsional constant of its suspension

C. The number of turns in its coil

D. The area of its coil

Answer: B

Watch Video Solution

294. A circular loop has a radius of $5cm$ and it is carrying a current of $0.1amp$. It magneitc moment is

A. $1.32 \times 10^{-4} amp - m^2$

B. $2.62 \times 10^{-4} amp - m^2$

C. $5.25 \times 10^{-4} amp - m^2$

D. $7.85 \times 10^{-4} amp - m^2$

Answer: D

Watch Video Solution

295. Due to the flow of current in a circular loop of radius R, the magnetic induction produced at the centre of the loop is B. The magnetic moment of the loop is (μ_0=permeability constant)

A. $BR^3 / 2\pi\mu_0$

B. $2\pi BR^3 / \mu_0$

C. $BR^2 / 2\pi\mu_0$

D. $2\pi BR^2 / \mu_0$

Answer: B

Watch Video Solution

296. The magnetic moment of a circular coil carrying current is

A. Directly proportional to the length of the wire in the coil

B. Inversely proportional to the length of the wire in the coil

C. Directly proportional to the square of the length of the wire in the coil

D. Inversely proportional to the square of the length of the wire in the coil

Answer: C

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297. A long wire A carries a current of 10 amp. Another long wire B, which is parallel to A and separated by $0.1m$ from A, carries a current of 5 amp, in the opposite direction to that in A. What is the magnitude and nature of the force experienced per unit length of B? $\left(\mu_0 = 4\pi \times 10^{-7} webe\frac{r}{a} mp - m\right)$

A. Repulsive force of $10^{-4} N/m$

B. Attractive force of $10^{-4} N/m$

C. Repulsive force of $2\pi \times 10^{-5} N/m$

D. Attractive force of $2\pi \times 10^{-5} N/m$

Answer: A

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298. A stream of electrons is projected horizontally to the right. A straight conductor carrying a current is supported parallel to the electron steam and above it. If the current in the conductor is from left to right, what will be the effect on the electron stream?

A. The electron stream will be pulled upward

B. The electron stream will be pulled downward

C. The electron stream will be retarted

D. The electron beam will be speeded up towards the right

Answer: B

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299. The relation between voltage sensitivity $'\sigma_V'$ and current sensitiviy σ_i of moving coil galvanometer if its resistance is $'G'$ is

A. $\dfrac{\sigma_i}{G} = \sigma_V$

B. $\dfrac{\sigma_V}{G} = \sigma_i$

C. $\dfrac{G}{\sigma_V} = \sigma_i$

D. $\dfrac{G}{\sigma_i} = \sigma_V$

Answer: A

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300. What is the shape of magnet in moving coil galvanometer to make the radial magnetic field ?

A. Concave

B. Horse shoe magnet

C. Convex

D. None of these

Answer: A

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301. If a wire of length l meter placed in uniform magnetic field 1.5 Tesla at angle 30° with magnetic field. The current in a wire 10 amp. Then force on a wire will be

A. $7.5N$

B. $1.5N$

C. $0.5N$

D. $2.5N$

Answer: A

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302. A current i flows in a circular coil of radius r. If the coil is placed in a uniform magnetic field B with its plane parallel to the field, magnitude of the torque that acts on the coil is

A. Zero

B. $2\pi riB$

C. $\pi r^2 iB$

D. $2\pi r^2 B$

Answer: C

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303. 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 megnetic field $\overrightarrow{B}$, the force on the coil is

A. Zero

B. lBL

C. $2lBL$

D. $\frac{1}{2}IBL$

Answer: A

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304. A circular coil having N turns is made from a wire of length L meter. If a current I ampere is passed through it and is placed in amagnetic field of B Tesla, the maximum torque on it is

A. Directly proportional to N

B. Inversely proportional to N

C. Inversely proportional to N^2

D. Independent of N

Answer: A

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305. A small cylindrical soft iron piece is kept in a galvanometer so that

A. A radial uniform magnetic field is produced

B. A uniform magnetic field is produced

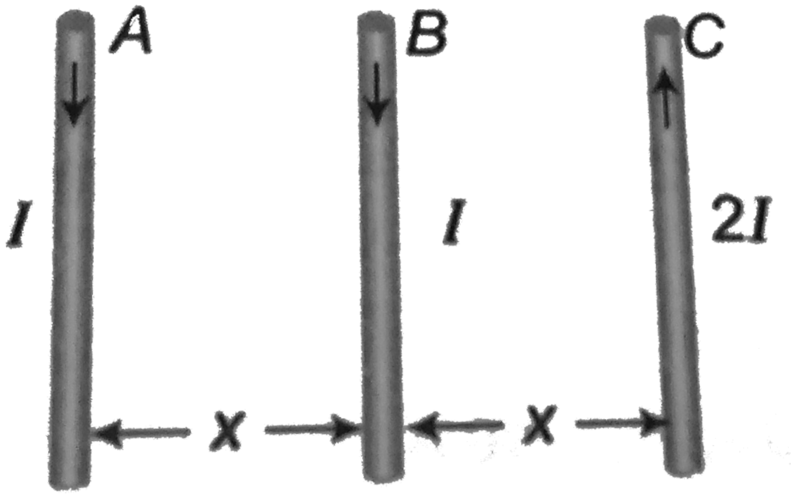
C. There is a steady deflection of the coil

D. All of these

Answer: D

Watch Video Solution

306. A, B and C are parallel conductors of equal length carrying currents I, I and $2I$ respectively. Distance between A and B is x. Distance between B and C is also x. F_1 is the force exerted by B on A and F_2 is the force exerted by B on C choose the correct answer



A. $F_1 = 2F_2$

B. $F_2 = 2F_1$

C. $F_1 = F_2$

D. $F_1 = -F_2$

Answer: D

Watch Video Solution

307. A straight conductor carries a current of $5A$. An electron travelling with a speed of $15 \times 10^6 ms^{-1}$ parallel to the wire at a distance of 0.1m from the conductor, experiences a force of

A. $8 \times 10^{-20} N$

B. $3.2 \times 10^{-19} N$

C. $8 \times 10^{-18} N$

D. $1.6 \times 10^{-19} N$

Answer: C

Watch Video Solution

308. Two galvanometers A and B require 3mA and 5mA respectively to produce the same deflection of 10 division then

A. A is more sensitive than B

B. B is more sensitive than A

C. A and B are equally sensitive

D. Sensitivities of B is $5/3$ times that of A

Answer: A

Watch Video Solution

309. Two long straight parallel conductors separated by a distance of $0.5m$ carry currents of $5A$ and $8A$ in the same direction. The force per unit length experienced by each other is

A. $1.6 \times 10^{-5}N$ (attractive)

B. $1.6 \times 10^{-5}N$ (repulsive)

C. $16 \times 10^{-5}N$ (attractive)

D. $16 \times 10^{-5} N$ (repulsive)

Answer: A

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310. IF the current is doubled, the deflection is also doubled in

A. A tangent galvanometer

B. A moving coil galvanometer

C. Both (a) and (b)

D. None of these

Answer: B

Watch Video Solution

311. Which is a vector quantity

A. Density

B. Magnetic flux

C. Intensity of magnetic field

D. Magnetic potential

Answer: C

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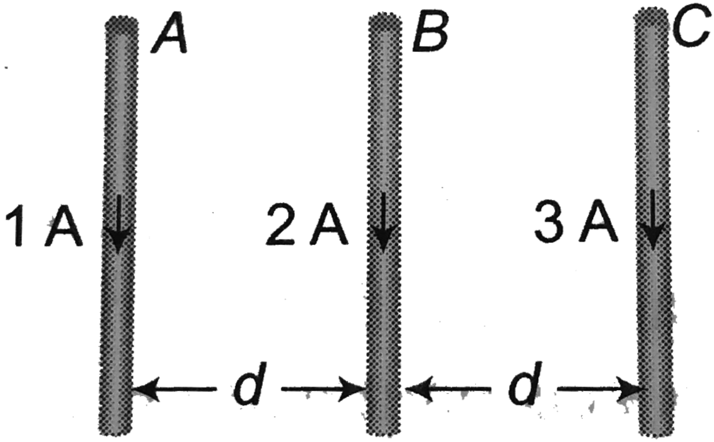
312. Three long straight wires A, B and C are carrying current as shown in figure. Then the resultant force on B is directed



A. Towards A

B. Towards C

C. Perpendicular to the plane of paper and outward

D. Perpendicular to the plane of paper and inward

Answer: B

Watch Video Solution

313. Two long conductors, separated by a distance d carry current I_1 and I_2 in the same direction . They exert a force F on each other. Now the current in one of them is increased to two times and its direction is reversed . The distance is also increased to $3d$. The new value of the force between them is

A. $-2F$

B. $F/3$

C. $2\frac{F}{3}$

D. $-F/3$

Answer: C

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314. The magnetic moment of atomic neon is

A. Infinite

B. μ

C. Zero

D. $\mu / 2$

Answer: C

Watch Video Solution

315. A 1m long conducting wire is lying at right angles to the magnetic field. A force of 1 kg. wt is acting on it in a magnetic field of 0.98 tesla. The current flowing in it will be-

A. $100A$

B. $10A$

C. $1A$

D. Zero

Answer: B

Watch Video Solution

316. A beam of electrons and protons move parallel to each other in the same direction, then they

A. Attract each other

B. Repel each other

C. No relation

D. Neither attract nor repel

Answer: A

Watch Video Solution

317. Two parallel wires of length $9m$ each are separated by a distance $0.15m$ .If they carry equal currents in the same direction and exerts a total force of $30 \times 10^{-7}N$ on each other, then the value of current must be

A. $2.5amp$

B. $3.5amp$

C. $1.5amp$

D. $0.5amp$

Answer: D

Watch Video Solution

318. Current i is carried in a wire of length L. If the wire is turned into a circular coil, the maximum magnitude of torque in a given magnetic field B will be

A. $\frac{LiB^2}{2}$

B. $\frac{Li^2B}{2}$

C. $\frac{L^2iB}{4\pi}$

D. $\frac{Li^2B}{4\pi}$

Answer: C

Watch Video Solution

319. In ballistic galvanometer, the frame on which the coil is wound is non-metallic. It is

A. Avoid the production of induced e.m.f.

B. Avoid the production of eddy currentsq

C. Increase the production of eddy currents

D. Increase the production of induced e.m.f.

Answer: B

Watch Video Solution

320. Two thin, long, parallel wires, separated by a distance 'd' carry a current of 'i' A in the same direction. They will

A. Attract each other with a force of $\mu_0 i^2 / (2\pi d^2)$

B. Repel each other with a force of $\mu_0 i^2 / (2\pi d^2)$

C. Attract each other with a force of $\mu_0 i^2 / (2\pi d)$

D. Repel each other with a force of $\mu_0 i^2 / (2\pi d)$

Answer: C

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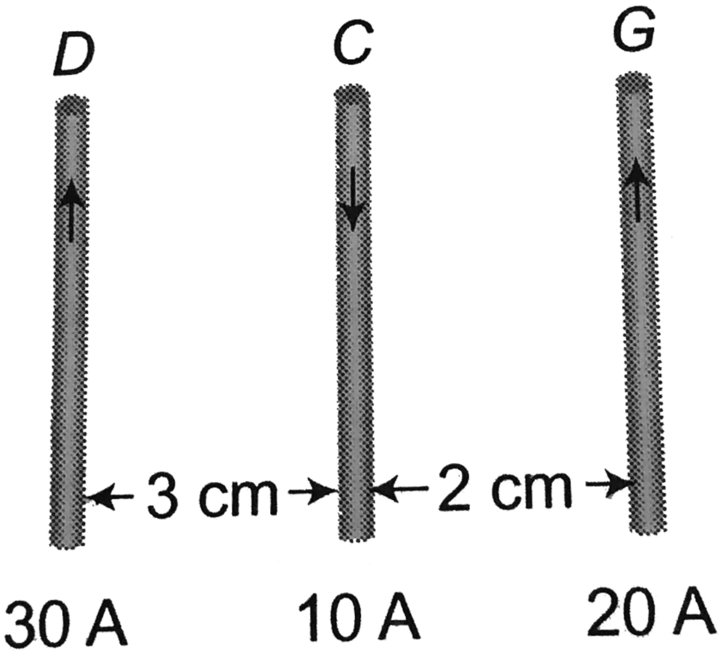
321. Three long, straight parallel wires carrying current, are arranged as shown in figure. The force experienced by a $25cm$ length of wire C is



A. $10^{-3}N$

B. $2.5 \times 10^{-3}N$

C. Zero

D. $1.5 \times 10^{-3} N$

Answer: C

Watch Video Solution

322. 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

A. $\frac{R}{\sqrt{3}}$

B. $R\sqrt{3}$

C. $2\sqrt{3}R$

D. $\frac{2}{\sqrt{3}}R$

Answer: B

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323. The field normal to the plane of a wire of n turns and radis r which carriers 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. $\frac{2}{3}\frac{r^2}{h^2}$

Answer: A

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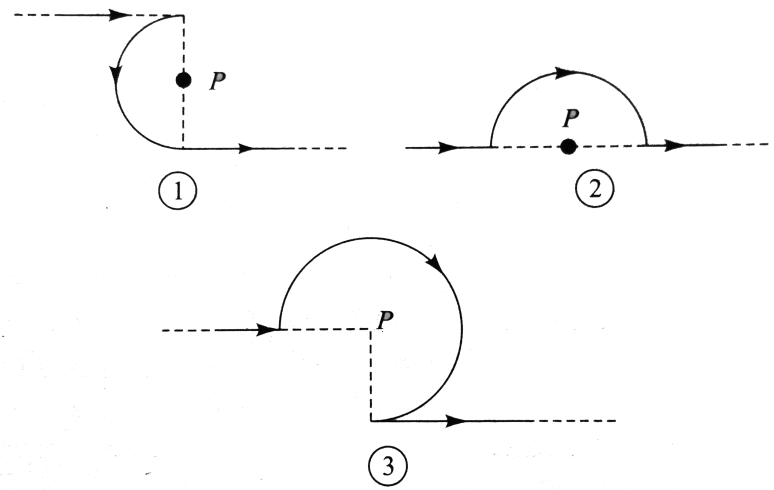
324. Figure shows three cases: in all case the circular part has radius r and straight ones are infinitely long. For the same current the ratio of field B at centre P in the three case $B_1 : B_2 : B_3$ is



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

Answer: A

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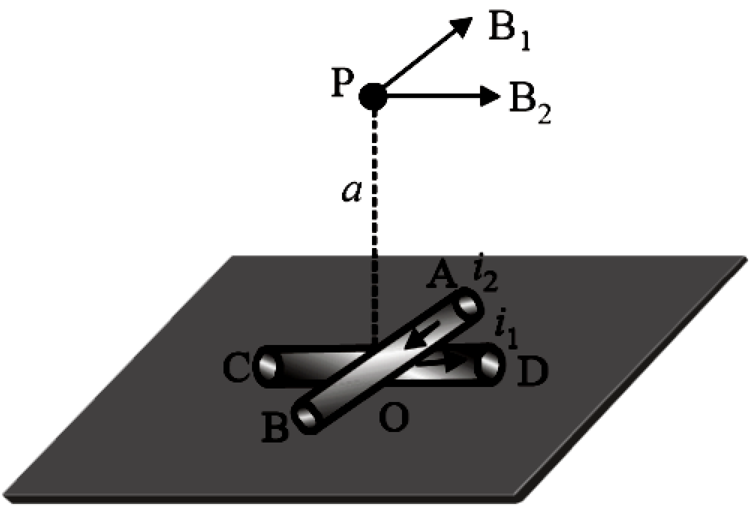
325. The straight long conductors AOB and COD are perpendicular to each other and carry current i_1 and i_2. The magnitude of the magnetic induction at point P at a distance a from the point O in a direction perpendicular to the plane ACBD is



A. $\frac{\mu_0}{2\pi a}(i_1 + i_2)$

B. $\frac{\mu_0}{2\pi a}(i_1 - i_2)$

C. $(\mu_0)(2\pi a)\left(i_1^2 + i_2^2\right)^{1/2}$

D. $\frac{\mu_0}{2\pi a}\frac{i_1 i_2}{(i_1 + i_2)}$

Answer: C

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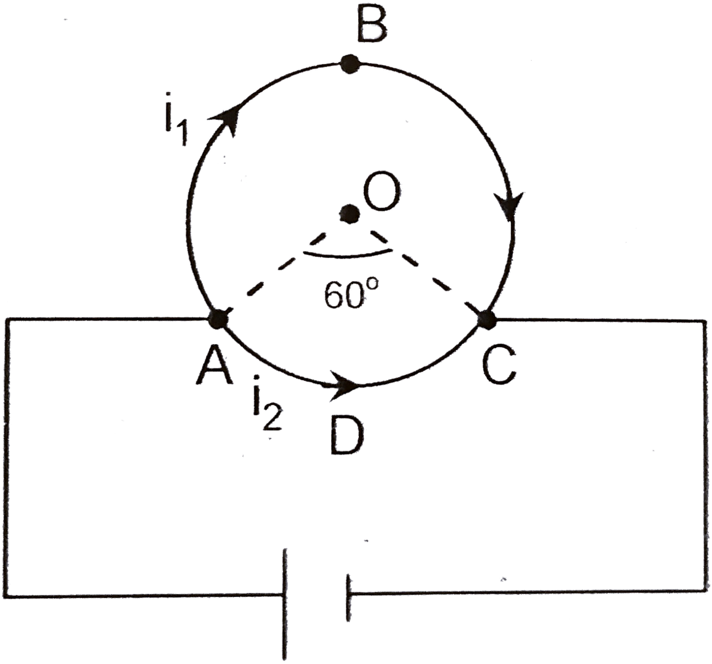
326. A cell is connected between the point A and C of a circular conductor ABCD of centre O, $\angle AOC = 60^\circ$. If B_1 and B_2 are the magnitude of magnetic fields at O due to the currents in ABC and ADC respectively, the ratio of B_1 / B_2 is.



A. 0.2

B. 6

C. 1

D. 5

Answer: C

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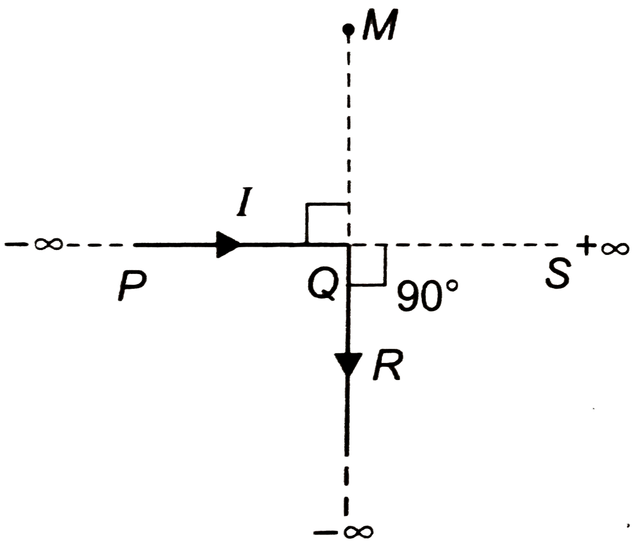
327. An infinetely long conductor PQR is bent to from a right angle as shown. A current I flows through PQR. The magnetic field due to this current at the point M is H_1.Now, another infinitely long straight conductor QS is connected at Q so that the current is $I/2$ in QR as well as in QS, the current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



A. $\frac{1}{2}$

B. 1

C. $\frac{2}{3}$

D. 2

Answer: C

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328. Two coaxil 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 current i_1 and i_2 are flowing in opposite directions. The magnetic field inside the inner coil is zero. This is possible when

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. $i_1 n_1 = i_2 n_2$

Answer: C::D

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329. A coil having N turns is would 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.

A. $\dfrac{\mu_0 NI}{b}$

B. $\dfrac{2\mu_0 NI}{a}$

C. $\dfrac{\mu_0 NI}{2(b-a)} In \dfrac{b}{a}$

D. $\dfrac{\mu_0 I^N}{2(b-a)} In \dfrac{b}{a}$

Answer: C

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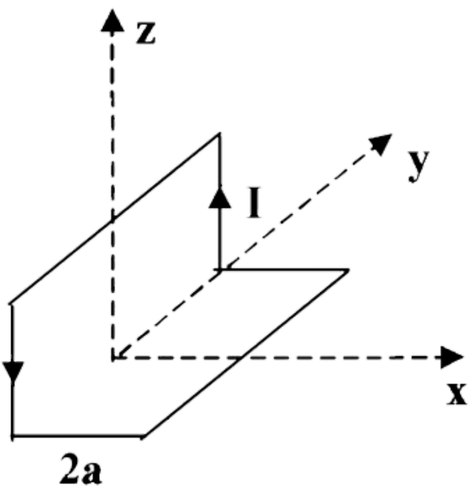
330. A non - popular loop of conducting wire carrying a current I is placed as shown in the figure . Each of the straighrt sections of the loop is of the length $2a$. The magnetic field due to this loop at the point $P(a, 0, a)$ points in the direction



A. $\frac{1}{\sqrt{2}}\left(-\hat{j}+\hat{k}\right)$

B. $\frac{1}{\sqrt{3}}\left(-\hat{j}+\hat{k}+\hat{i}\right)$

C. $\frac{1}{\sqrt{3}}\left(\hat{i}+\hat{j}+\hat{k}\right)$

D. $\frac{1}{\sqrt{2}}\left(\hat{i}+\hat{k}\right)$

Answer: D

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331. A long straight wire along the z- axis carries a current I in the negative $z-direction$. The magnetic vector field $\overrightarrow{B}$ at a point having coordinates (x,y) in the $Z=0$ plane is

A. $\frac{\mu_0 I\left(y\hat{i}-x\hat{j}\right)}{2\pi(x^2+y^2)}$

B. $\frac{\mu_0 I\left(x\hat{i}+y\hat{j}\right)}{2\pi(x^2+y^2)}$

C. $\frac{\mu_0 I\left(x\hat{j}-y\hat{i}\right)}{2\pi(x^2+y^2)}$

D. $\frac{\mu_0 I\left(x\hat{i}-y\hat{j}\right)}{2\pi(x^2+y^2)}$

Answer: A

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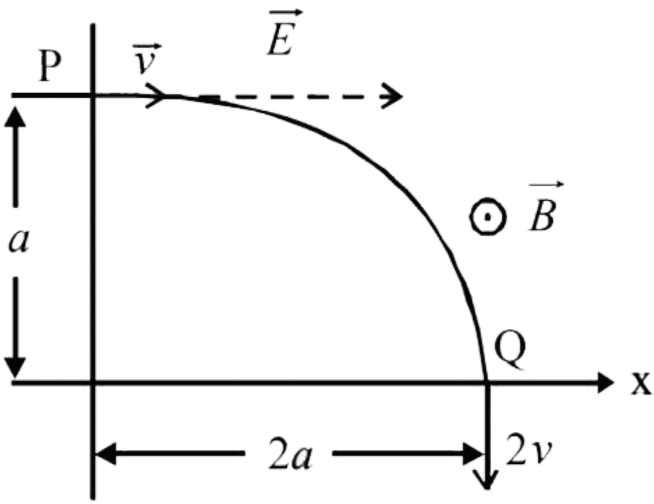
332. A particle of charge $+q$ and mass m moving under the influence of a uniform electric field $E\hat{i}$ and uniform magnetic field $B\hat{k}$ follows a trajectory from $P \rightarrow Q$ as shown in fig. The velocities at P and Q are $v\hat{i}$ and $-2v\hat{j}$. which of the following statement(s) is/are correct ?



A. $E = \frac{3}{4}\frac{mv^2}{qa}$

B. Rate of work done by electric field at P is $\frac{3}{4}\frac{mv^3}{a}$

C. Rate of work done by electric field at P is zero

D. Rate of work done by both the fields at Q is zero

Answer: A::B::D

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333. H^+, He^+ and O^{++} all having the same kinetic energy pass through a region in which there is a uniform magnetic field perpendicular to their velocity . The masses of H^+, He^+ and O^{2+} are $1a\mu$, $4a\mu$ and $16a\mu$ respectively . Then

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

Answer: A::C

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334. 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 $+y$ - direction and the negative ions towardws $-y$ - direction

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

Answer: C

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335. An electron is moving with speed $2 \times 10^5 m/s$ along the positive x-direction in the presence of magnetic induction $\vec{B} = (\hat{i} + 4\hat{j} - 3\hat{k})T$. The magnitude of the force experienced by the electron in $N(e = 1.6 \times 10^{-19}C)\left(\vec{F} = q\left(\vec{v} \times \vec{B}\right)\right)$

A. 1.18×10^{-13}

B. 1.28×10^{-13}

C. 1.6×10^{-13}

D. 1.72×10^{-13}

Answer: C

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336. 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

A. qbB/m

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

C. qaB/m

D. $a(b+a)B/2m$

Answer: B

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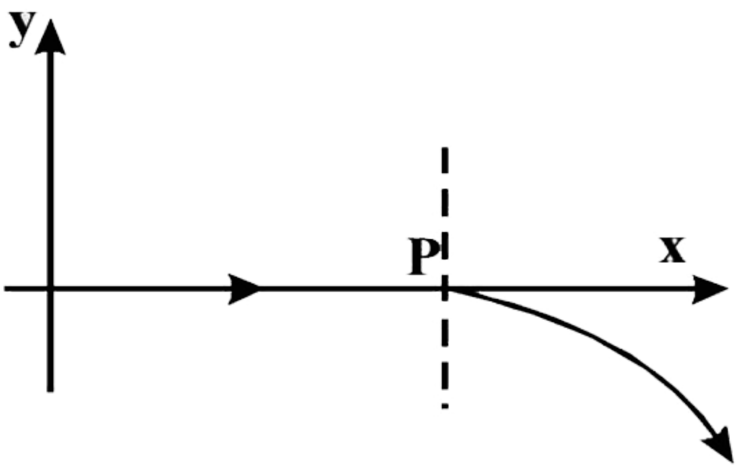
337. For a positively charged particle moving in a $x - y$ plane initially along the $x - a\xi s$, there is a sudden change in its path due to the presence of electric and//or magnetic fields beyond p . The curved path is shown in the $x - y$plane and is found to be non - circular. Which one of the following combinations is possible ?



A. $\overrightarrow{E} = 0, \overrightarrow{B} = b\hat{i} + c\hat{k}$

B. $\overrightarrow{E} = ai, \overrightarrow{B} = c\hat{k} + a\hat{i}$

C. $\overrightarrow{E} = 0, \overrightarrow{B} = c\hat{j} + b\hat{k}$

D. $\overrightarrow{E} = ai, \overrightarrow{B} = c\hat{k} + b\hat{j}$

Answer: B

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338. A horizontal rod of mass $10g$ and length $10cm$ is placed on a smooth plane inclined at an angle of 60° with the horizontal with the length of the rod parallel to the edge of the inclined plane. A uniform magnetic field induction B is applied vertically downwards. If the current through the rod is $1 \cdot 73ampere$, the value of B for which the rod remains stationary on the inclined plane is

A. 1.73 Tesla

B. $\frac{1}{1.73}$ Tesla

C. 1 Tesla

D. None of the above

Answer: C

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339. A wire of length $L metre$, carrying a current Iampere is bent in the form of a circle . The magnitude of its magnetic moment is .... $MKS units$.

A. $\frac{IL}{4\pi}$

B. $\frac{IL^2}{4\pi}$

C. $\frac{I^2L^2}{4\pi}$

D. $\dfrac{I^2 L}{4\pi}$

Answer: B

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340. A thin circular wire carrying a current I has a magnetic moment M. The shape of the wire is changed to a square and it carries the same current. It will have a magnetic moment

A. M

B. $\dfrac{4}{\pi^2}M$

C. $\dfrac{4}{\pi}M$

D. $\dfrac{\pi}{4}M$

Answer: D

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341. A particle of charge q and mass m moves in a circular orbit of radius r with angular speed ω. The ratio of the magnitude of its magnetic moment to that of its angular momentum depends on

A. ω and q

B. ωq and m

C. q and m

D. ω and m

Answer: C

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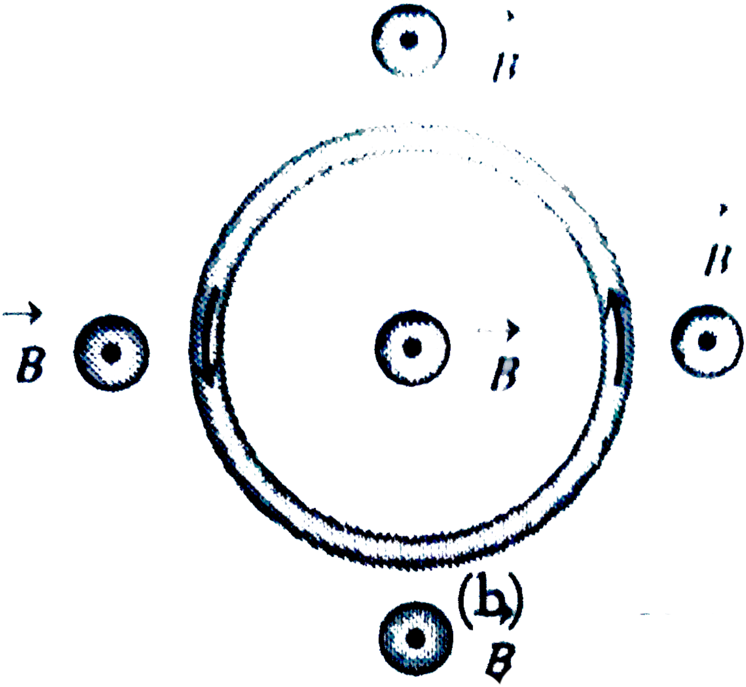
342. An elastic circular wire of length l carries a current I. It is placed in a uniform magnetic field $\overrightarrow{B}$ (Out of paper) such that its plane is perpendicular to the direction of $\overrightarrow{B}$. The wire will experience



A. No force

B. A stretching force

C. A compressive force

D. A torque

Answer: B

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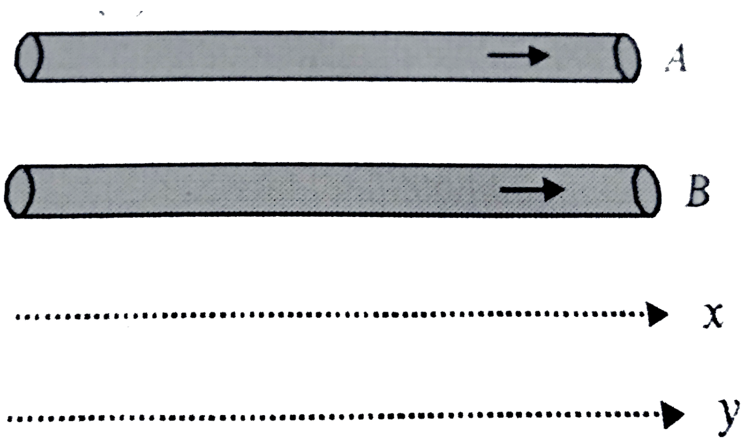
343. A and B are two conductors carrying a current i in the same direction x and y are two electron beams moving in the same direction. Then



A. There will be repulsion between A and B attraction between x and y

B. There will be attraction between A and B, repulsion between x and y

C. There will be repulsion between A and B and also x and y

D. There will be attraction between A and B and also x and y

Answer: B

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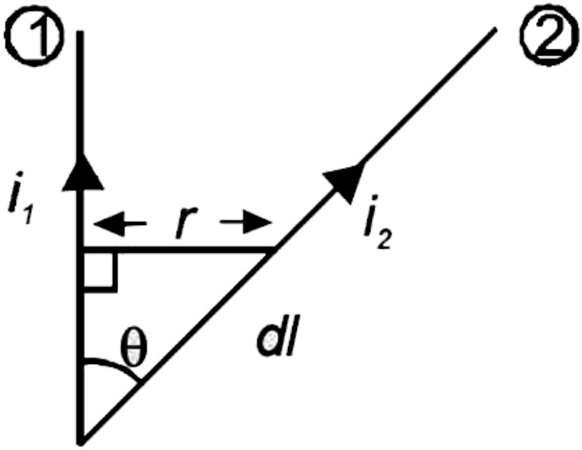
344. Wires 1 and 2 carrying currents i_1 and i_2 respectively are inclined at an angle θ to each other. What is the force on a small element dl of wire 2 at a distance of r from wire 1 (as shown in figure) due to the magnetic field of wire 1`?



A. $\frac{\mu_0}{2\pi r} i_1 i_2 dl \tan\theta$

B. $\frac{\mu_0}{2\pi r} i_1 i_2 dl \sin\theta$

C. $\frac{\mu_0}{2\pi r} i_1 i_2 dl \cos\theta$

D. $\frac{\mu_0}{4\pi r} i_1 i_2 dl \sin\theta$

Answer: C

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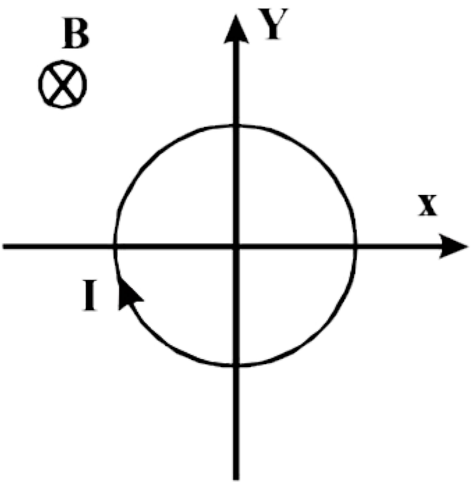
345. A conducting loop carrying a current I is placed in a uniform magnetic field ponting into the plane of the paper as shown. The loop will have a tendency to



A. Contract

B. Expand

C. Moves towards $+vex$-axis

D. Move towards $-vex$- axis

Answer: B

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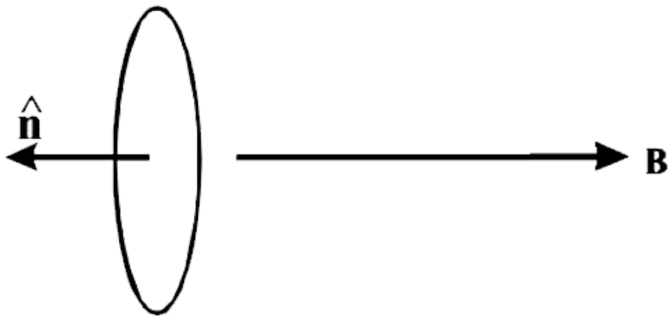
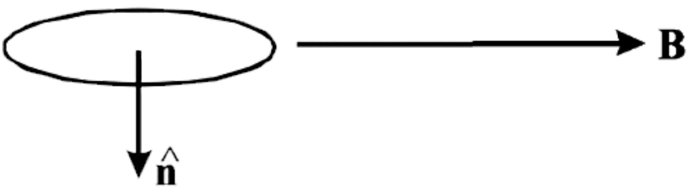
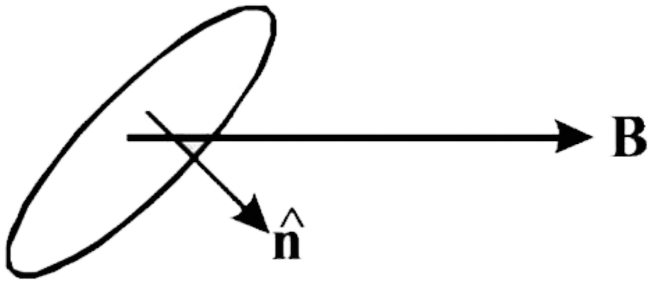
346. A current carrying loop is placed in a uniform magnetic field in four different orientations , I,ii,iii & iv arrange them in the decreasing order of potential Energy`

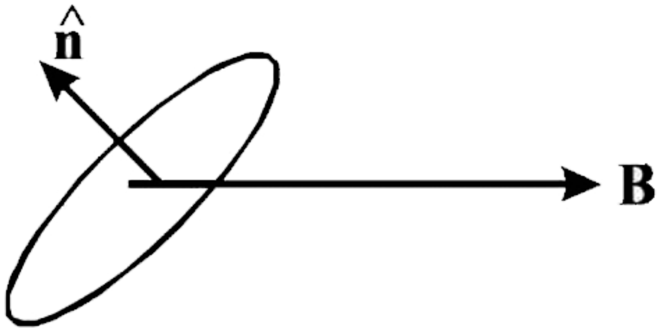
I. 

II. 

III



IV



A. $I > III > II > IV$

B. $I > II > III > IV$

C. $I > IV > II > III$

D. $III > IV > I > II$

Answer: C

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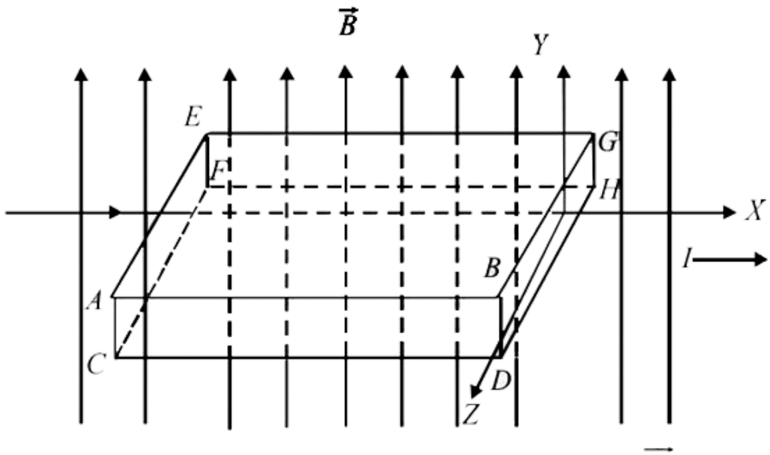
347. A metallic block carrying current I is subjected to a uniform magnetic induction

$\overrightarrow{B} asshown \in Figure. Themov \in gchar \geq s \exp erienceaf$ or ce

vec(F) given by ..... Which results in the lowering of the potential of the face .... Assume the speed of the carries to be v .



A. $eVb\hat{k}, ABCD$

B. $eVB\hat{k}, EFGH$

C. $-eVB\hat{k}, ABCD$

D. $-eVB\hat{k}, EFGH$

Answer: A

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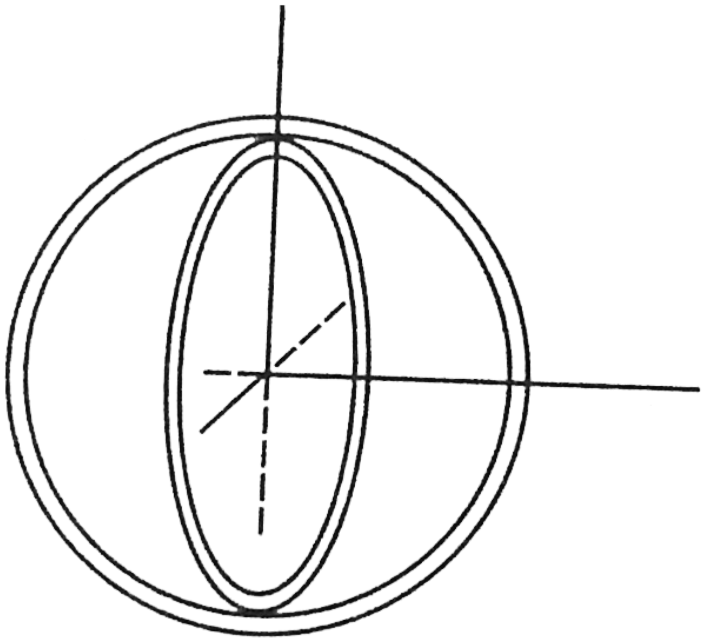
348. Two insulated rings, one of a slighlty smaller diameter than the other are suspended along their common diameter as shown. Initially the planes of the rings are mutually perpendicular. When a steady current is set up each of them



A. The two rings rotate into a common plane

B. The inner ring oscillates about its initial position

C. The inner ring stays stationary while the outer one moves into the plane of the inner ring

D. The outer ring stays stationary while the inner one moves into the plane of the outer ring

Answer: A

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349. Two particles , each of mass m and charge q, are attached to the two ends of a light rigid rod of length $2R$. The rod is rotated at constant angular speed about a perpendicular axis passing through its centre. The ratio of the magnitudes of the magnetic moment of the system and its angular momentum about the centre of the rod is

A. $\frac{q}{2m}$

B. $\frac{q}{m}$

C. $\frac{2q}{m}$

D. $\frac{q}{\pm}$

Answer: A

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350. Two very long, straight , parallel wires carry steady currents $I \& -I$ respectively . The distance between the wires is d. At a certain instant of time, a point charge q is at a point equidistant from the wires , in the plane of the wires. Its instantaneous vel,ocity v is perpendicular to this plane. The magnitude of the force due to the magnetic field acting on the charge at this instant is

A. $\frac{\mu_0 Iqv}{2\pi d}$

B. $\frac{\mu_0 Iqv}{\pi d}$

C. $\frac{2\mu_0 Iqv}{\pi d}$

D. 0

Answer: D

Watch Video Solution

351. A ring of radius R, made of an insulating material carries a charge Q uniformly distributed on it. If the ring rotates about the axis passing through its centre and normal to plane of the ring with constant angular speed ω, then the magnitude moment of the ring is

A. $Q\omega R^2$

B. $\frac{1}{2}Q\omega R^2$

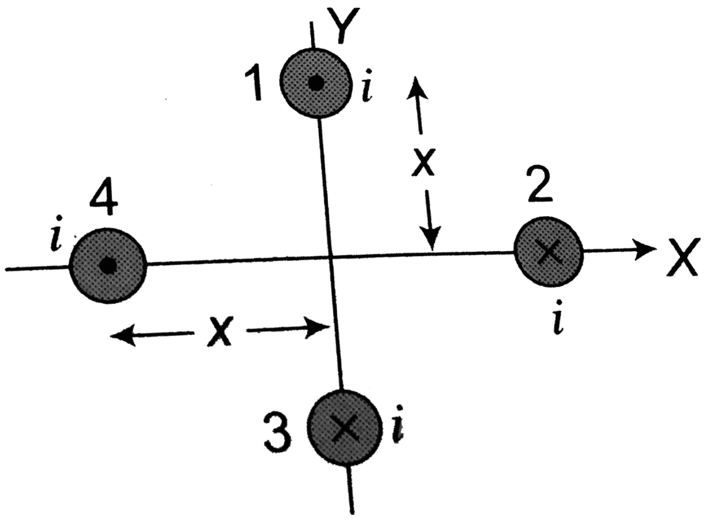
C. $Q\omega^2 R$

D. $\frac{1}{2}Q\omega^2 R$

Answer: B

Watch Video Solution

352. What will be the resulatant field at the origin due to the four indinite length wires if each wire produces magnetic field B at origin ?



A. $4B$

B. $\sqrt{2}B$

C. $2\sqrt{2}B$

D. Zero

Answer: C

Watch Video Solution

353. 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. $\frac{\pi}{2\sqrt{2}}$

D. $\frac{\pi}{4\sqrt{2}}$

Answer: B

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354. Two infinite length wires carries currents $8A$ and $6A$ 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. $\frac{10\mu_0}{\pi d}$

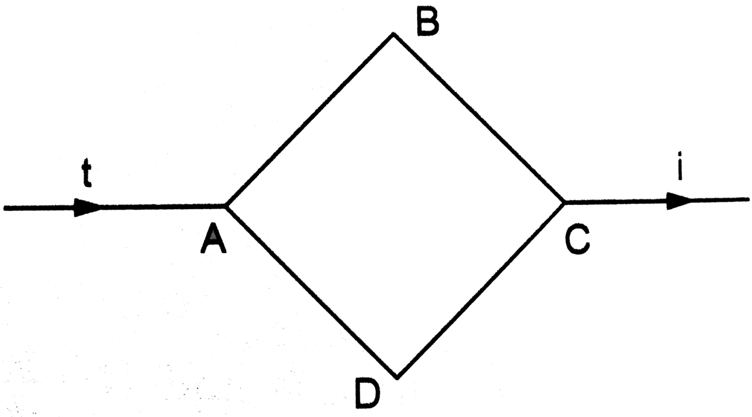
C. $\frac{14\mu_0}{\pi d}$

D. $\frac{5\mu_0}{\pi d}$

Answer: D

Watch Video Solution

355. Figure shows a square loop ABCD with edge length a. The resistance of the wire ABC is r and that of ADC is $2r$. Find the magnetic field B at the centre of the loop assuming uniform wires. `



A. $\frac{\sqrt{2}\mu_0 i}{3\pi a} \odot$

B. $\frac{\sqrt{2}\mu_0 i}{3\pi a} \otimes$

C. $\frac{\sqrt{2}\mu_0 i}{\pi a} \odot$

D. $\frac{\sqrt{2}\mu_0 i}{\pi a} \otimes$

Answer: B

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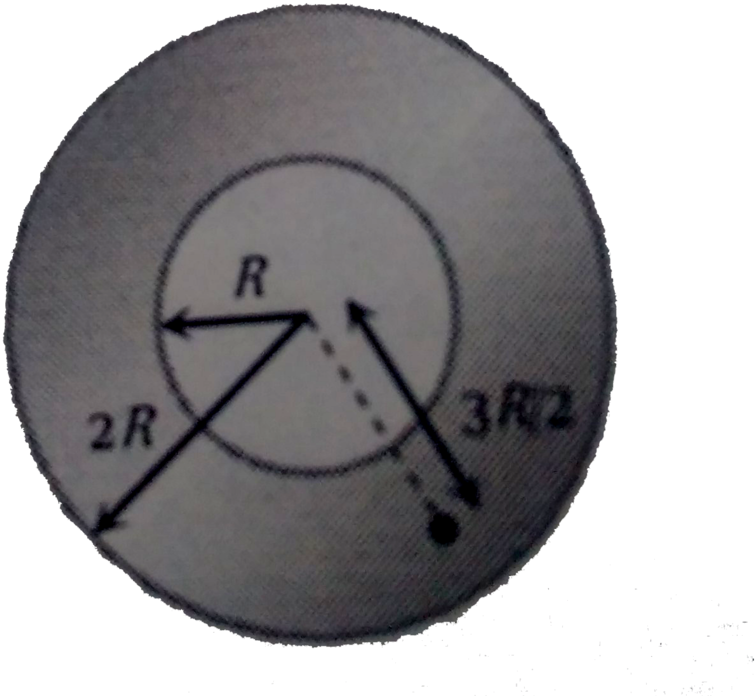
356. Figure shows the cross-sectional view of the hollow cylindrical conductor with inner radius $'R'$ and outer radius $'2R'$, cylinder carrying uniformly distributed current along it's axis. The magnetic induction at point $'P'$ at a distance $\frac{3R}{2}$ from the axis of the cylinder will be



A. Zero

B. $\frac{5\mu_0 i}{72\pi R}$

C. $\dfrac{7\mu_0 i}{18\pi R}$

D. $\dfrac{5\mu_0 i}{36\pi R}$

Answer: D

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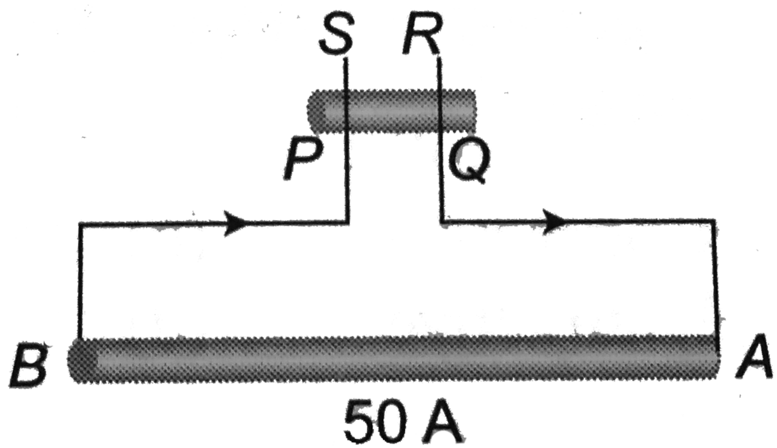
357. A long wire AB is placed on a table. Another wire PQ of mass $1.0g$ and length $50cm$ is set to slide on two rails PS and QR. A current of $50A$ is passed through the wires. At what distance above AB, will the wire PQ be in equilibrium?



A. $25mm$

B. $50mm$

C. $75mm$

D. $100mm$

Answer: A

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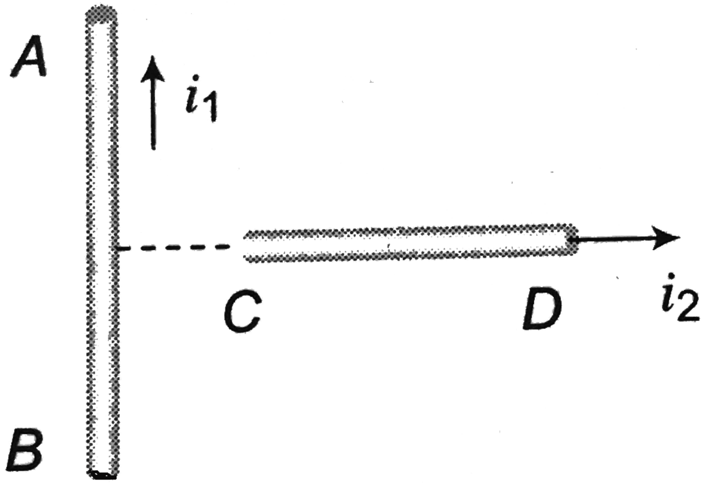
358. An infinitely long, straight conductor AB is fixed and a current is passed through it. Another movable straight wire CD of finite length and carrying current is held perpendicular to it and released. Neglect weight of the wire



A. The rod CD will move upwards parallel to itself

B. The rod CD will move downward parallel to itself

C. The rod CD will move upward and turn clockwise at the same time

D. The rod CD will move upward and turn anti –clockwise at the same time

Answer: C

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359. A steady current i flows in a small square lopp of wire of side L in a horizontal plane. The loop is now folded about its middle such that half of it lies in a vertical plane. Let $\overrightarrow{\mu}_1$ and $\overrightarrow{\mu}_2$ respectively denote the magnetic moments due to the current loop before and after folding. Then

A. $\overrightarrow{\mu_2} = 0$

B. $\overrightarrow{\mu_1}$ and $\overrightarrow{\mu_2}$ are in the same direction

C. $\frac{\left|\overrightarrow{\mu_1}\right|}{\left|\overrightarrow{\mu_2}\right|} = \sqrt{2}$

D. $\frac{\left|\overrightarrow{\mu_1}\right|}{\left|\overrightarrow{\mu_1}\right|} = \left(\frac{1}{\sqrt{2}}\right)$

Answer: C

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360. 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. $\frac{\mu_0 i}{2\pi L}$

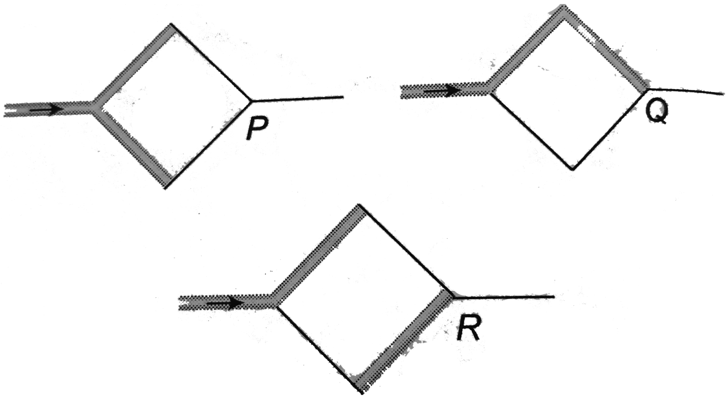
C. $\frac{\mu_0 i}{\sqrt{2}L}$

D. Zero

Answer: A

Watch Video Solution

361. Two thick wires and two thin wires, all of the same materais and same length from a square in the three differenct ways, P, Q and R as shwon in figure with current connection shown, the magneitc feidl 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

Answer: D

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362. 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 q in crossing the field. Then

A. $\sin\theta = \frac{Bqd}{p}$

B. $\sin\theta = \frac{p}{Bqd}$

C. $\sin\theta = \frac{Bp}{qd}$

D. $\sin\theta = \frac{pd}{Bq}$

Answer: A

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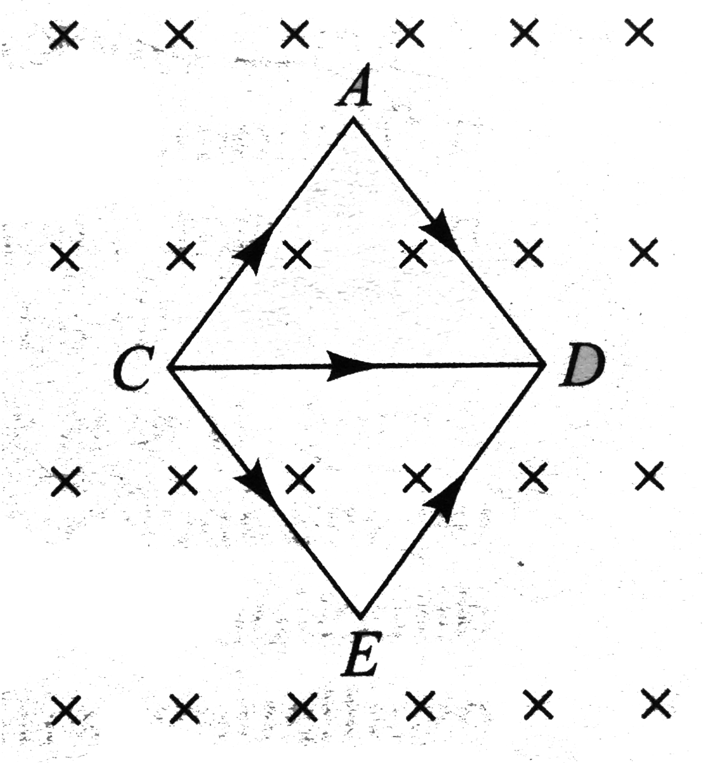
363. Let current $i = 2A$ be flowing in each part of a wire frame as shown in Fig. 1.138. The frame is a combination of two equilateral triangles ACD and CDE of side 1 m. It is placed in uniform magnetic field $B = 4T$ acting perpendicular to the plane of frame. The magnitude of magnetic force acting on the frame is



The pithc of the helical path followed by the particle is p. The radius of the helix will be

A. $24NB$

B. Zero at the centre of loop

C. $16N$

D. $8N$

Answer: A

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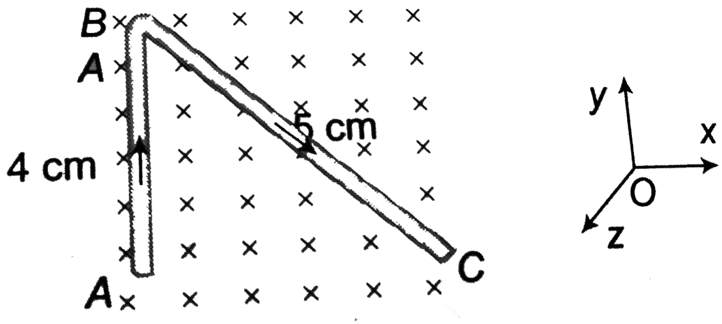
364. A unifrom conducting wire ABC has a mass of $10g$. A current of $2A$ flows through it. The wire is kept in a unifrom magnetic field $B = 2T$. The accleration of the wire will be



A. Zero

B. $12ms^{-2}$ along y-axis

C. $1.2 \times 10^{-3} ms^{-2}$ along y -axis

D. $0.6 \times 10^{-3} ms^{-2}$ along y- axis

Answer: B

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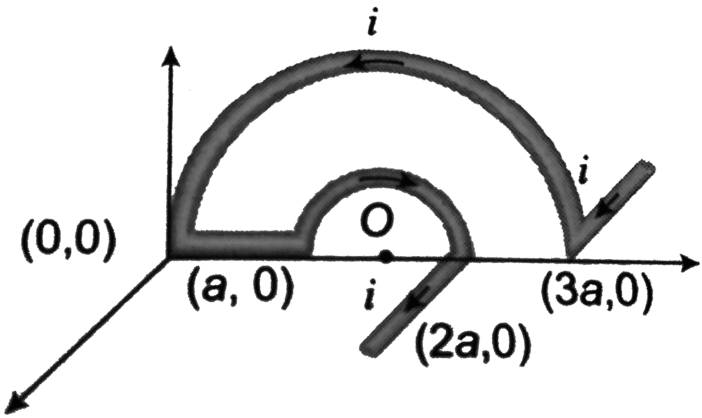
365. In the given figure net magnetic at O will be



A. $\frac{2\mu_0 i}{3\pi a}\sqrt{4-\pi^2}$

B. $\frac{\mu_0 i}{3\pi a}\sqrt{4+\pi^2}$

C. $\frac{2\mu_0 i}{3\pi a^2}\sqrt{4+\pi^2}$

D. $\frac{2\mu_0 i}{3\pi a}\sqrt{(4-\pi^2)}$

Answer: B

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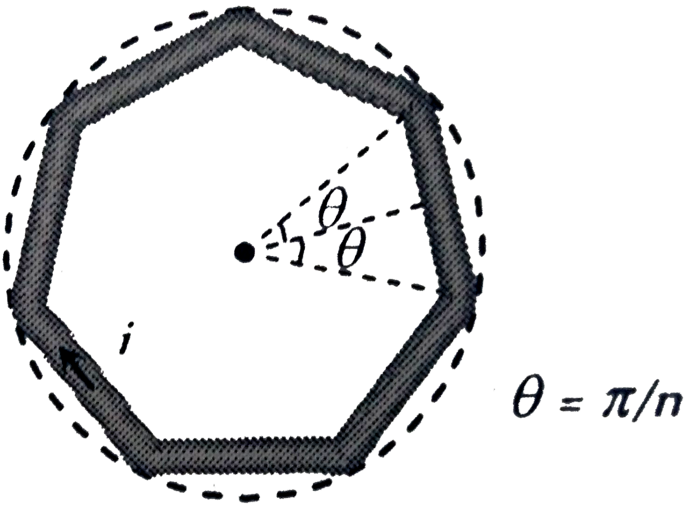
366. In the following figure a wire bent in the form of a regular polygon of n sides is inscribed in a circle of radius a. Net magnetic field at centre will be



A. $\frac{\mu_0 i}{2\pi a}\tan\frac{\pi}{n}$

B. $\frac{\mu_0 n i}{2\pi a}\tan\frac{\pi}{n}$

C. $\frac{2}{\pi}\frac{n i}{a}\mu_0\tan\frac{\pi}{n}$

D. $\frac{n i}{2a}\mu_0\tan\frac{\pi}{n}$

Answer: B

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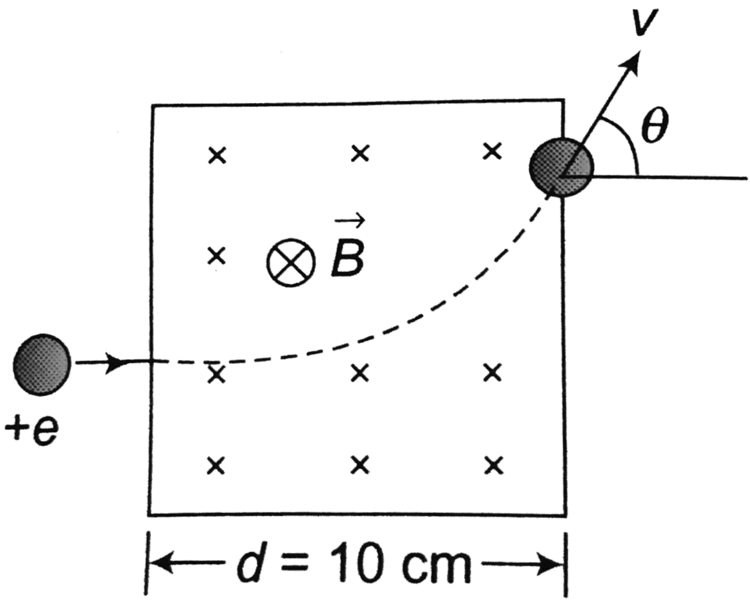
367. A proton accelerated by a potential difference $500KV$ moves though a transverse field of $0.51T$ as shown in figure. The angle θ through which the proton deviates from the intial direction of its motion is



A. 15°

B. 30°

C. 45°

D. 60°

Answer: B

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368. 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 nagative 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

Answer: A

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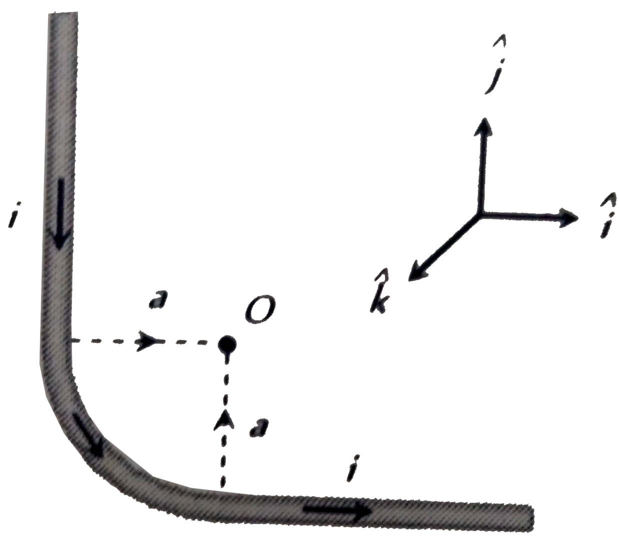
369. The unit vectors $\hat{i}$, $\hat{j}$ and $\hat{k}$ are as shown below. What will be the magnetic field at O in the following figure



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

Answer: D

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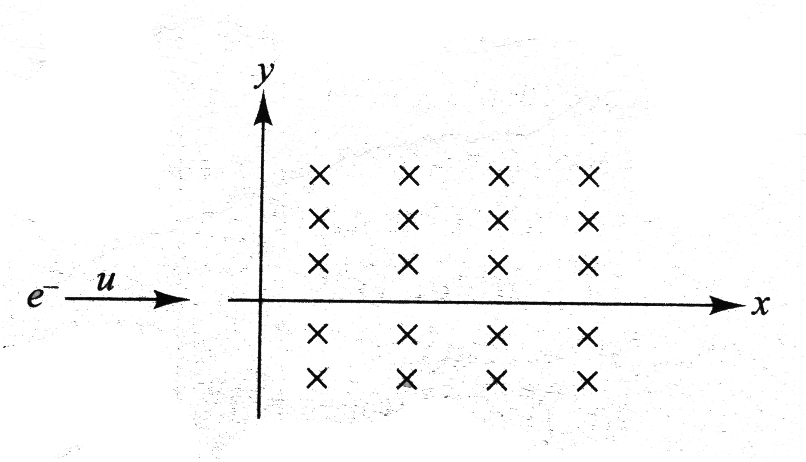
370. An electron moving with a speed u along the positive x-axis at $y=0$ enters a region of uniform magnetic field which exists to the right of y-axis. The electron exits from the region after some time with the speed v at coordinate y, then



A. $v > u, y < 0$

B. $v = u, y > 0$

C. $v > u, y > 0$

D. $v = u, y < 0$

Answer: D

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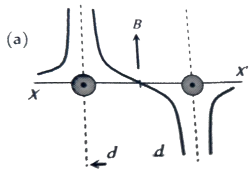
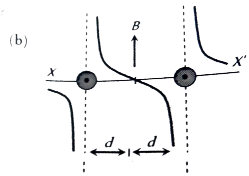
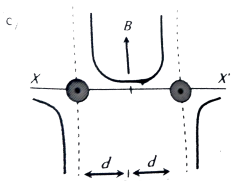
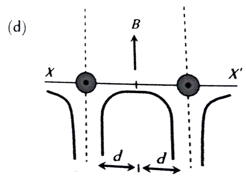
371. Two very thin metallic wires placed along X and Y axes carry equal currents as shown AB and CD are lines at 45° with the axes having origin at O the magnetic field will be zero on the line

A. 

B. 

C. 

D. 

Answer: A

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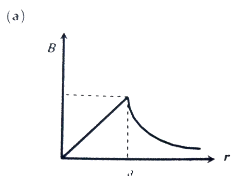
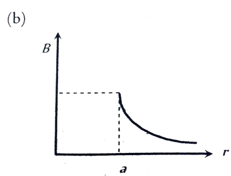
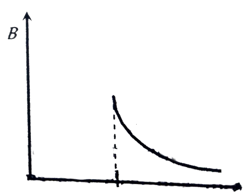
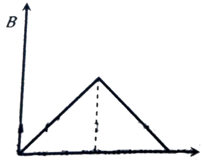
372. Two long parallel wires are at a distance $2d$ apart. They carry steady equal currents flowing out of the plane of the paper , as shown. The variation of the magnetic field B along the line XX is given by

A. 

B. 

C. 

D. 

Answer: B

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373. The magnetic field due to a conductor fo unifrom cross section of radius a and carrying a steady current is represented by

A.

B.

C.

D.

Answer: A

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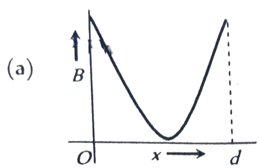
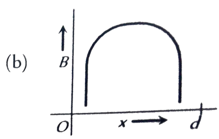
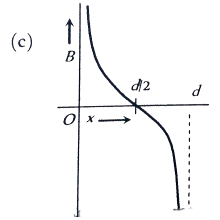
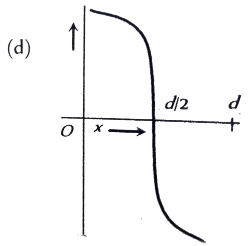
374. Two parallel beams of protons and electrons, carrying equal currents are fixed at a separation d. The protons and electrons move in opposite directions. There is a point P on the straight perpendicular line joining the two beams at a distance x from one beam. The magnetic field at this point is B. If B is plotted against x, it can be represented by the curve.

A. 

B. 

C. 

D. 

Answer: C

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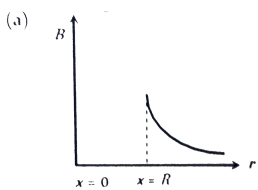
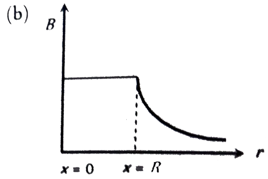
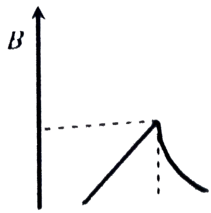
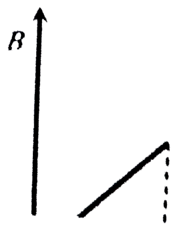
375. A long thin hollow metallic cylinder of radius $'R'$ has a current i ampere. The magnetic induction $'B'$ -away from the axis at a distance r from the axis varies as shown in

A. 

B. 

C. 

D. 

Answer: A

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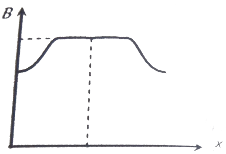
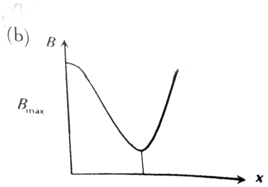
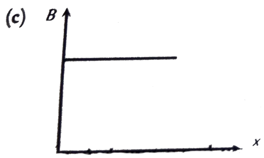
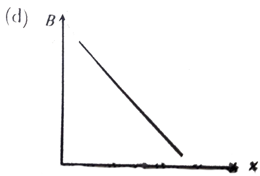
376. The correct curve between the magnetic induction (B) along the axis of a along solenoid due to current flow i in it and distance x from one end is -

A. 

B. 

C. 

D. 

Answer: A

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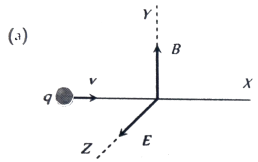
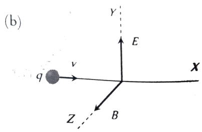
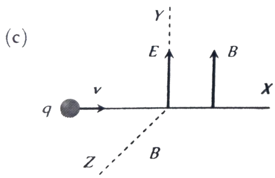
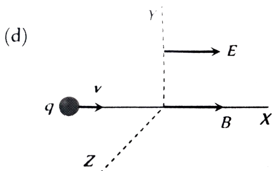
377. A particle of charge q and mass m is moving along the x-axis with a velocity v and enters a region of electric field E and magnetic field B as shown in figures below. For which figure the net force on the charge may be zero?

A. 

B. 

C. 

D. 

Answer: B

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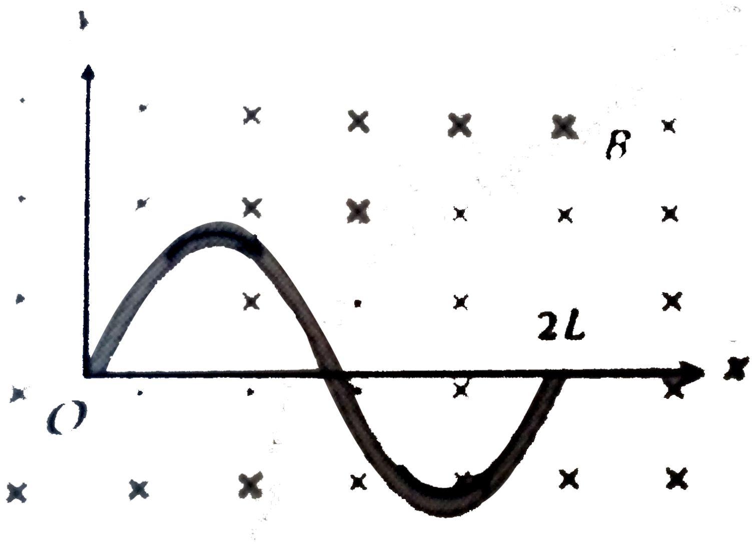
378. A wire carrying a current i is placed in a uniform magnetic field in the form of the curve $y = a\sin\left(\frac{\pi x}{L}\right) 0 \leq x \leq 2L$. The force acting on the wire is



A. $\frac{iBL}{\pi}$

B. $iBL\pi$

C. $2iBL$

D. zero

Answer: C

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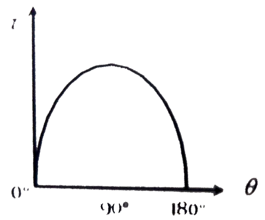
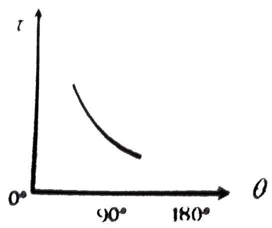
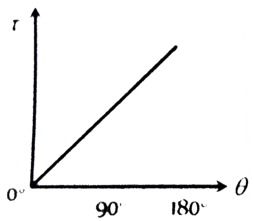
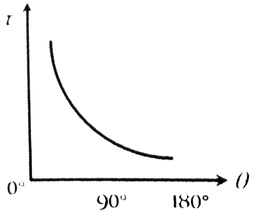
379. The $(\tau - \theta)$ graph for a current carrying coil placed in a uniform magnetic field is

A. 

B. 

C. 



D.

Answer: A

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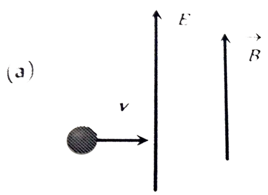
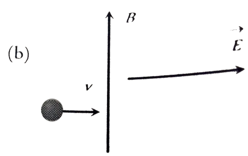
380. A uniform magnetic field B and a uniform electric field E act in a common region. An electron is entering this region of space. The correct arrangement for it to escape undeviated is



A.



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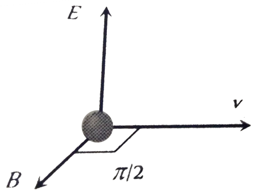
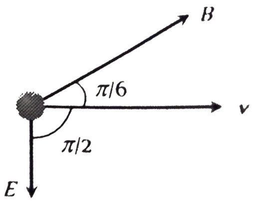
C. 

D. 

Answer: C

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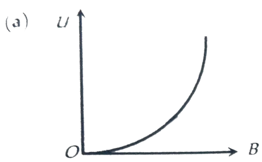
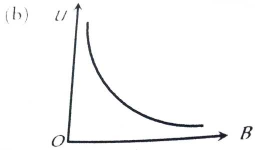
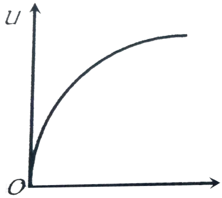
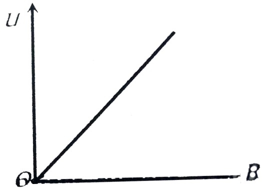
381. If induction of magnetic field at a point is B and energy density is U then which of the following graphs is correct

A. 

B. 

C. 

D. 

Answer: A

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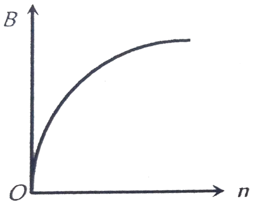
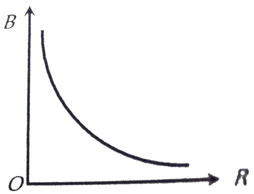
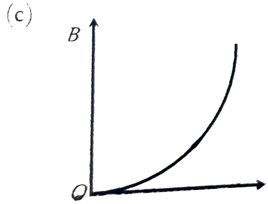
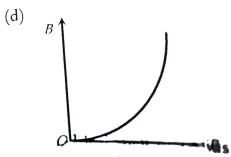
382. A thin wire of length l is carrying a constant current. The wire is bent to form a circular coil. If radius of the coil, thus formed, is equal to R and number of turns in it is equal to n, then which of the following graphs represent (s) variation of magnetic field induction (B) at centre of the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

A. 

B. 

C. 

D. 

Answer: B::C

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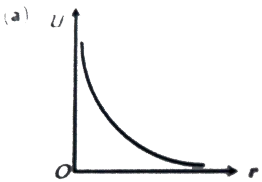
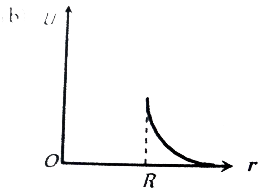
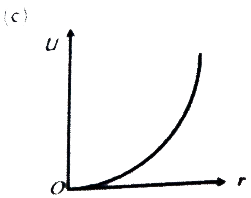
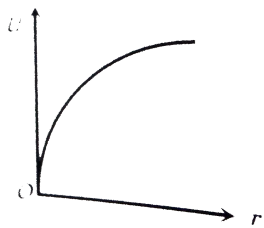
383. A current is flowing through a thin cylindrical shell of radius R. If energy density in the medium, due to magnetic field, at a distance r from axis of the shell is equal to U then which of the following graphs is correct

A. 

B. 

C. 

D. 

Answer: B

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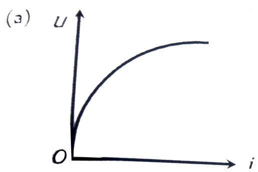
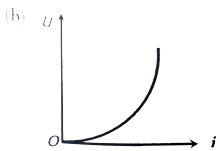
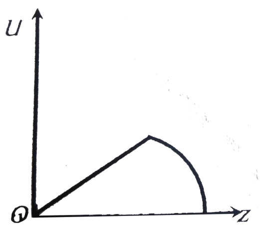
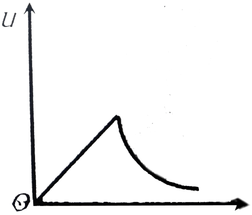
384. If current flowing through shell of previous objective is equal to i, then energy density at a point distance $2R$ from axis of the shell varies according to the graph

A. 

B. 

C. 

D. 

Answer: B

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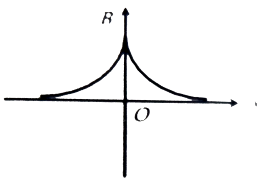
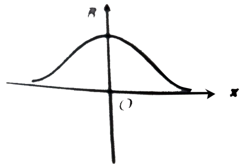
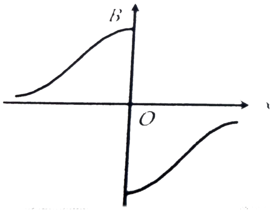
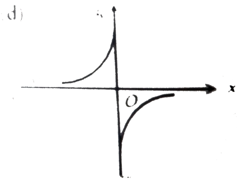
385. A circular coil is in $y - z$ plane with centre at origin. The coil is carrying a constant current. Assuming direction of magnetic field at $x = -25cm$ to be positive direction of magnetic field, which of the following graphs shows variation of magnetic field along x-axis

A. 

B. 

C. 

D. 

Answer: B

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386. Assertion: Cyclotron does not accelerate.

Reason: Mass of the electron is very small.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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387. Assertion: Cyclotron is a device which is used to accelerate the position ions.

Reason: Cyclotron frequency depends upon the velocity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

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388. Assertion : Magnetic field interacts with a moving charge and not with a stationary charge.

Reason : A moving charge produces a magnetic field.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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389. Statement - 1 : If an electron is not deflected while passing through a certain region of space, then only possibility is that there is no magnetic region. Statement - 2 : Magnetic force is directly proportional to the magnetic field applied.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

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390. Assertion: Free electron always keep on moving in a conductor even then no magnetic force act on them in magnetic field unless a current is passed through it.

Reason: The average velocity of free electron is zero.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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391. Assertion: The ion cannot move with a speed beyond a certain limit in a cyclotron.

Reason: As velocity increases time taken by ion increases.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

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392. Assertion: The coil is bound over the metallic fram in moving coil galvanometer.

Reason: The metallic fram help in making steady deflected without any oscillation.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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393. Assertion: A circular loop carrying current lies in XY plane with its centre at origin having a magnetic flux in negative Z-axis.

Reason: Magnetic flux direction is independent of the direction of current in the conductor.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

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394. Assertion: The energy of charged particle moving in uniform magnetic field does not change.

Reason: Work done by magnetic field on the charge is zero.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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Others

1. What should be the current in a circular coil of radius $5cm$ to annual $B_H = 5 \times 10^{-5} T$

A. $0.4A$

B. $4A$

C. $40A$

D. $1A$

Answer: B

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2. A current of $0.1A$ circulates around a coil of 100 turns and having a radius equal to $5cm$. The magnetic field set up at the centre of the coil is $\left(\mu = 4\pi \times 10^{-5} \text{weber}/\text{amp-metre}\right)$

A. 2×10^{-5} Tesla

B. 4×10^{-5} Tesla

C. $8\pi \times 10^{-5}$ Tesla

D. $4\pi \times 10^{-5}$ Tesla

Answer: D

View Text Solution

3. On flowing current in a conducting wire the magnetic field produces around it.' It is a law of

A. Lenz

B. Ampere

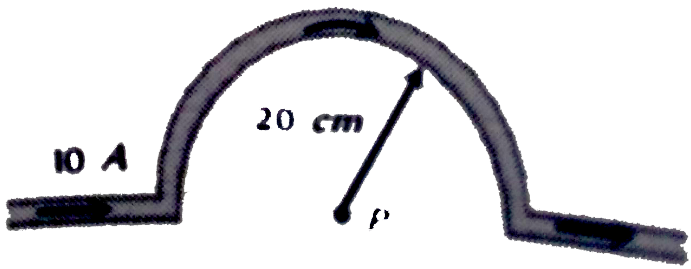
C. Ohm

D. Maxwell

Answer: B

View Text Solution

4. A current of $10A$ is passing through a long wire which has semicircular loop of the radius $20cm$ as shown in the figure. Magnetic field produced at the centre of the loop is



A. $10\pi\mu T$

B. $5\pi\mu T$

C. $4\pi\mu T$

D. $2\pi\mu T$

Answer: B

View Text Solution

5. The magnetic induction at the centre of a current carrying circular of coil radius r, is

A. Directly proportional to r

B. Inversely proportional r

C. Directly proportional to r

D. Inversely proportional to r

Answer: B

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6. When the current flowing in a circular coil is doubled and the number of turns of the coil in it is halved, the magnetic field at its centre will become

A. Four times

B. Same as at Q

C. Half

D. Double

Answer: B

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7. 20 ampere current is flowing in a long straight wire. The intensity of magnetic field at a distance 10 cm from the wire will be

A. $4 \times 10^{-5} Wb/m$

B. $9 \times 10^{-5} Wb/m$

C. $8 \times 10^{-5} Wb/m$

D. $6 \times 10^{-5} Wb/m$

Answer: A

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8. The field due to a long straight wire carrying a current I is proportional to

A. l

B. I^3

C. $\sqrt{I}$

D. $\frac{1}{I}$

Answer: A

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9. When a magnetic field is applied in a direction perpendicular to the direction of cathode rays, then their

A. Energy decreases

B. Energy increases

C. Momentum increases

D. Momentum and energy remain unchanged

Answer: D

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10. A moving coil sensitive galvanometer gives at once much more deflection. To control its speed of deflection

A. A high resistance is to be connected across its terminals

B. A magnet should be placed near the coil

C. A small copper wire should be connected across its terminals

D. The body of galvanometer should be earthed

Answer: B

View Text Solution

11. The pole pieces of the magnet used in a pivoted coil galvanometer are

A. Plane surfaces of a bar magnet

B. Plane surfaces of a horse-shoe magnet

C. Cylindrical surfaces of a bar magnet

D. Cylindrical surfaces of a horse-shoe magnet

Answer: D

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12. A metallic loop is placed in a magnetic field. If a current is passed through it, then

A. The ring will feel a force of attraction

B. The ring will feel a force of repulsion

C. It will move to and fro about its centre of gravity

D. None of these

Answer: D

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13. A circular coil of 20 turns and radius 10 cm is placed in uniform magnetic field of $0.10T$ normal to the plane of the coil. If the current in coil is $5A$, then the torque acting on the coil will be

A. $31.4Nm$

B. $3.14Nm$

C. $0.314Nm$

D. Zero

Answer: D

View Text Solution

14. Two long wires are hanging freely. They are joined first in parallel and then in series and then are connected with a battery. In both cases, which type of force acts between the two wires

A. Attraction force when in parallel and repulsion force when in series

B. Repulsion force when in parallel and attraction force when in series

C. Repulsion force in both cases

D. Attraction force in both cases

Answer: A

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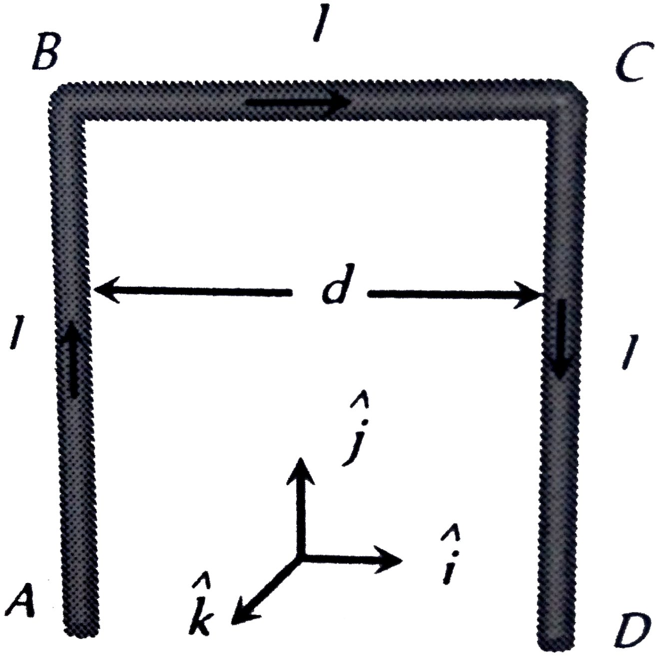
15. AB and CD are long straight conductor, distance d apart, carrying a current I. The magnetic field at the midpoint of BC is



A. $\frac{-\mu_0 I}{2\pi d}\hat{k}$

B. $\frac{-\mu_0 I}{\pi d}\hat{k}$

C. $\frac{-\mu_0 I}{4\pi d}\hat{k}$

D. $\frac{-\mu_0 I}{8\pi d}\hat{k}$

Answer: B

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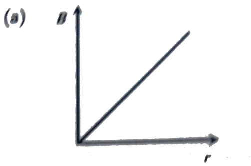
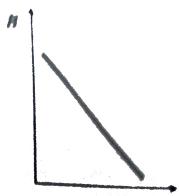
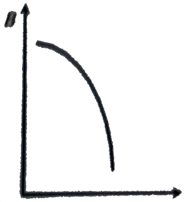
16. Which of the following graphs shows the variation of magnetic induction B with distance r from a long wire carrying current

A. 

B. 

C. 

(d) 

D.

Answer: C

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17. Assertion : If an electron, while coming vertically from outerspace, enter the earth's magnetic field, it is deflected towards west.

Reason : Electron has negative charge.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

View Text Solution

18. Assertion : A direct current flows through a metallic rod, produced magnetic field only outside the rod.

Reason : There is no flow of charge carriers inside the rod.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

View Text Solution

19. Assertion : An electron and proton enters a magnetic field with equal velocities, then, the force experienced by the proton will be more than electron.

Reason : The mass of proton is 1837 times more than electron.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

View Text Solution

20. Assertion : Torque on the coil is the maximum, when coil is suspended in a radial magnetic field.

Reason : The torque tends to rotate the coil on its own axis.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

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21. Assertion : A loosely round helix made of stiff wire is suspended vertically with the lower end just touching a dish of mercury. When a current is passed through the wire, the helical wire executes oscillatory motion with the lower end jumping out of and inside of mercury.

Reason : When electric current is passed through helix, a magnetic field is produced both inside and outside the helix.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

View Text Solution

22. Assertion : The magnetic filed at the ends of a very long current carrying solenoid is half of that at the center.

Reason : If the solenoid is sufficiently long, the field within it is uniform.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

View Text Solution

23. Assertion : If a charged particle is moving on a circular path in a perpendicular magnetic field, the momentum of the particle is not changing,.

Reason : Velocity of the particle in not changing in the magnetic field.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

View Text Solution

24. Assertion : If a proton and an α-particle enter a uniform magnetic field perpendicularly, with the same speed, then the time period of revolution of the -particle is double than that of proton.

Reason : In a magnetic field, the time period of revolution of a charged particle is directly proportional to mass.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

View Text Solution

25. Assertion : If two long wires, hanging freely are connected to a battery in series, they come closer to each other.

Reason : Force of attraction acts between the two wires carrying current.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

View Text Solution

26. Assertion : A current I flows along the length of an infinitely long straight and thin walled pipe. Then the magnetic field at any point inside the pipe is zero.

Reason : $\oint \overrightarrow{B} . d\overrightarrow{l} = \mu_0 I$

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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27. In hydrogen atom, the electron is making 6.6×10^{15} revolution per second in a circular path of radius $0.53A^{\circ}$. What is the magnetic induction produced at the centre of the orbit?

A. 140 Tesla

B. 12.5 Tesla

C. 1.4 Tesla

D. 0.14 Tesla

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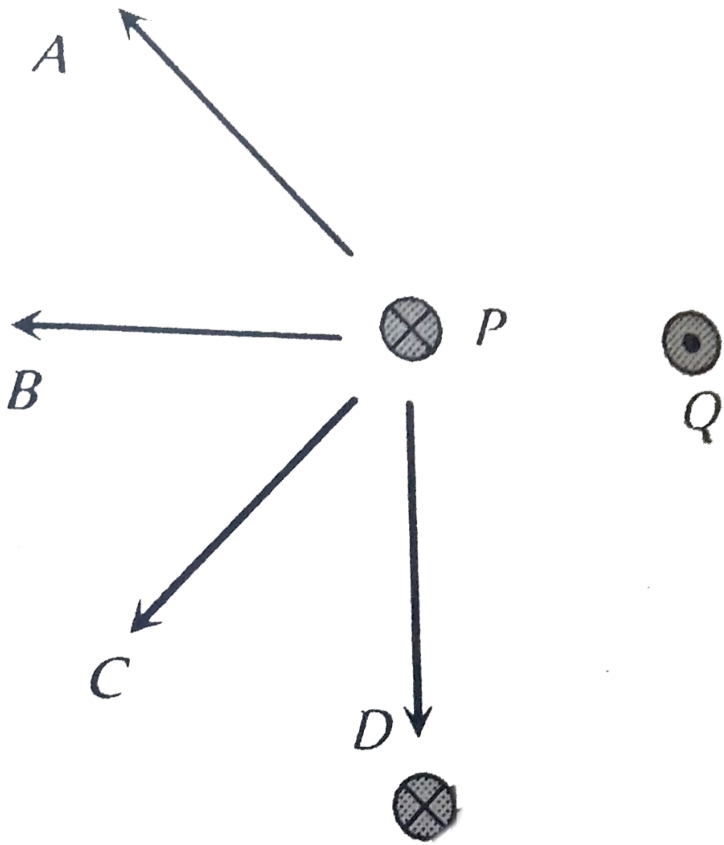
28. In figure shows three long straight wires P, Q and R carrying currents normal to the plane of the paper. All three currents have the same magnitude. Which arrow best shows the direction of the resultant force on the wire P



A. A and B will repel each other with same force

B. B

C. C

D. D

29. A square loop of side a hangs from an insulating hanger of spring balance. The magnetic field of strength B occurs only at the lower edge. It carries a current I . Find the change in the reading of the spring balance if the direction of current is reversed.

A. laB

B. $2laB$

C. $\frac{IaB}{2}$

D. $\frac{3}{2}IaB$

30. Five very long, straight insulated wires are closely bound together to form a small cable. Currents carried by the wires are: $I_1 = 20A, I_2 = -6A, I_3 = 12A, I_4 = -7A, I_5 = 18A.$ (Negative currents are opposite in direction to the positve.) The magnetic field induction at a distance of 10cm from the cable is (current enters at A and leaves at B and C as shown)

A. $34\mu T$

B. $74mT$

C. $34mT$

D. $74\mu T$

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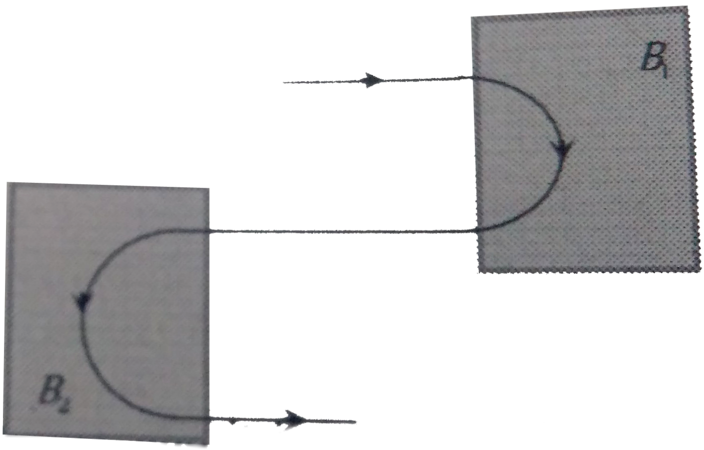
31. Following figure shows the path of an electron that passes through two regions containing uniform magnetic fields of magnitudes B_1 and B_2 . It's path in each region is a half circle, choose the correct option



A. B_1 is into the page and it is stronger than B_2

B. B_1 is in to the page and it is weaker than B_2

C. B_1 is out of the page and it is weaker than B_2

D. B_1 is out of the page and it is stronger than B_2

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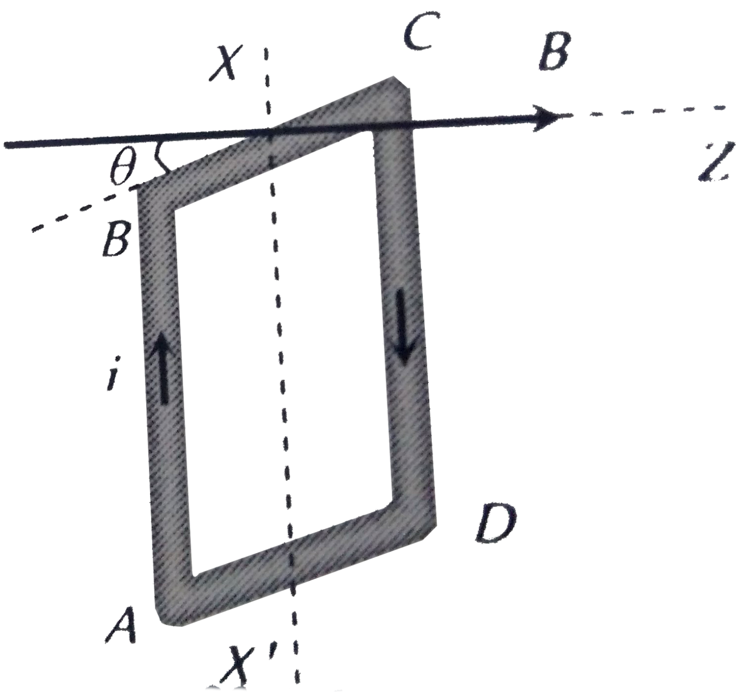
32. The square loop $ABCD$, carrying a current i, is placed in uniform magnetic field B, as shown. The loop can rotate about the axis XX'. The plane of the loop makes and angle $\theta(\theta < 90^\circ)$ with the direction of B. Through what angle will the loop rotate by itself before the torque on it becomes zero



A. θ

B. $90^\circ - \theta$

C. $90^\circ + \theta$

D. $180^\circ - \theta$

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33. A cylindrical conductor of radius $'R'$ carries a current $'i'$. The value of magnetic field at a point which is $R/4$ distance inside from the surface is $10T$. Find the value of magnetic field at point which is $4R$ distance outside from the surface

A. $\frac{4}{3}T$

B. $\frac{8}{3}T$

C. $\frac{40}{3}T$

D. $\frac{80}{3}T$

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34. Three long straight wires are connected parallel to each other across a battery of negligible internal resistance. The ratio of their resistances are $3:4:5$. What is the ratio of distances of middle wire from the others if the net forces experienced by it is zero.

A. $4:3$

B. $3:1$

C. $5:3$

D. $2:3$

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