PHYSICS

BOOKS - DISHA PHYSICS (HINGLISH)

MOVING CHARGES AND MAGNETISM

Physics

1. An insulating rod of length I carries a charge q distrubuted uniformly on it. The rod is pivoted at its mid-point and is rotated at a

frequency f about a fixed axis perpendicular to the the rod and passing through the pivot . The magnetic moment of the rod system is

A. 6

B. 4

C. 5

D. 8

Answer:

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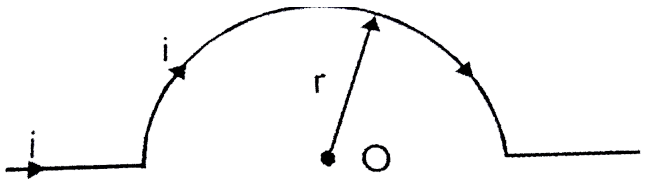
2. A portion of a conductive wire is bent in the form of a semicircle of radius r as shown below in fig. at centre of semicircle, the magnetic induction will be



A. zero

B. infinite

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

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

Answer:

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

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

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

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

D. $1.5 \times 10^{-2} N - m$

Answer:

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4. An alternate electric field of frequency v, is applied across the dees $(radius = R)$ of a cyclotron that is being used to accelerate

protons $(\text{mass} = m)$. The operating magnetic field (b) used in the cyclotron and the kinetic energy (K) of the proton beam, produced by it, are given by

A. $B = \frac{mv}{e}$ and $k = 2m\pi^2v^2R^2$

B. $B = \frac{2\pi mv}{e}$ and $K = m^2\pi vR^2$

C. $B = \frac{2\pi mv}{e}$ and $k = 2m\pi^2v^2R^2$

D. $B = \frac{mv}{e}$ and $k = m^2\pi vR^2$

Answer:

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5. A glavanometer of 50Ω resistance has 25 divisions. A current of 4×10^{-4} A gives a deflection of one division. To convert this galvanometer into a voltmeter having a range of $25V$, it should be connected with a resistance of

A. 2450Ω in series

B. 2500Ω series.

C. 245Ω in series

D. 2550Ω series.

Answer:

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6. If we double the radius of a current carrying coil keeping the current unchanged, the magnetic field at its centre

A. double

B. three times

C. four times

D. one-fourth

Answer:

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7. A particle mass m charge Q and kinetic energy T eneters transverse unifrom magnetic fiedl of induction $\overrightarrow{B}$ After s the kinetic energy or the particle will be

A. 3T

B. 2T

C. T

D. 4T

Answer:

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8. A 10eV electron is circulating in a plane at right angles to a uniform field at magnetic induction $10^{-4} Wb/m^2$ (=1.0 gauss). The orbital radius of the electron is

A. 12cm

B. 16cm

C. 11cm

D. 18cm

Answer:

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9. A uniform electric field and a uniform magneitc field exist in a region in the same direction An electron is projected with velocity pointed in the same direction the electron will

A. turn to its right

B. turn to its left

C. keep moving in the same direction but its speed will increase

D. keep moving in the same direction but its speed will decrease

Answer:

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10. Proton , deuton and alpha particle of same kinetic energy are moving in circular trajectories in a constant magnetic field. The radii of proton , deuteron and alpha particle are respectively $r_p, r_d \text{ and } r_\alpha$. Which one of the following relation is correct?

A. $r_\alpha = r_p = r_d$

B. $r_\alpha = r_p < r_d$

C. $r_\alpha > r_d > r_p$

D. $r_\alpha = r_d > r_p$

Answer:

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11. A moving coil galvanometer has 150 equal divisions. Its current sensitivity is 10-divisions per milliampere and voltage sensitivity is 2 divisions per millivolt. In order that each division reads 1 volt, the resistance in ohms needed to be connected in series with the coil will be -

A. 10^5

B. 10^3

C. 9995

D. 99995

Answer:

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12. A $2\mu C$ charge moving around a circle with a frequency of 6.25×10^{12} Hz produces a

magnetic field 6.28 tesla at the centre of the circle. The radius of the circle is

A. 2.25m

B. 0.25m

C. 13.0m

D. $1.25m$

Answer:

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13. A charged particle with charge q enters a region of constant, uniform and mututally orthogonal fields $\overrightarrow{E}$ and $\overrightarrow{B}$ with a velocity $\overrightarrow{v}$ perpendicular to both $\overrightarrow{E}$ and $\overrightarrow{B}$, and comes out without any change in magnitude or direction of $\overrightarrow{v}$. Then

A. $\overrightarrow{v} = \overrightarrow{B} \times \overrightarrow{E} / E^2$

B. $\overrightarrow{v} = \overrightarrow{E} \times \overrightarrow{B} / B^2$

C. $\overrightarrow{v} = \overrightarrow{B} \times \overrightarrow{E} / B^2$

D. $\overrightarrow{v} = \overrightarrow{E} \times \overrightarrow{B} / E^2$

Answer:

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14. A square current carrying loop is suspended in a unifrom magnetic field acting in the palne of the loop. If the force on one arm of the loop is $\vec{F}$, the net force on the remaining three arms of the loop is

A. $3\vec{F}$

B. $-\vec{F}$

C. $-3\overrightarrow{F}$

D. $\overrightarrow{F}$

Answer:

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15. A straight section PQ of a circuit lise 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:

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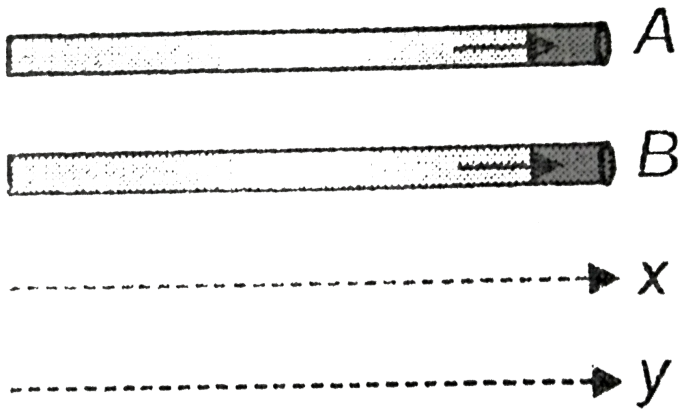
16. A and B are two conductors carrying a current i in the same direction x and y are two electron beams moving in the same direction.

There will be



A. there will be repulsion between A and B

attraction betwwen 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:

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17. A galvanometer of resistance G is shunted by a resistance $Sohm$. To keep the main current in the circuit uncharged, the resistnace to be put in series with the galvonmeter

A. $\frac{S^2}{(S+G)}$

B. $\frac{SG}{(S+G)}$

C. $\frac{G^2}{(S+G)}$

D. $\frac{G}{(S+G)}$

Answer:

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18. A current I flows an infinitely long wire with cross section in the form of a semi -

circular ring of radius R. The magnitude of the magnetic induction along its axis is :

A. $\frac{\mu_0 I}{2\pi^2 R}$

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

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

D. $\frac{\mu_0 I}{\pi^2 R}$

Answer:

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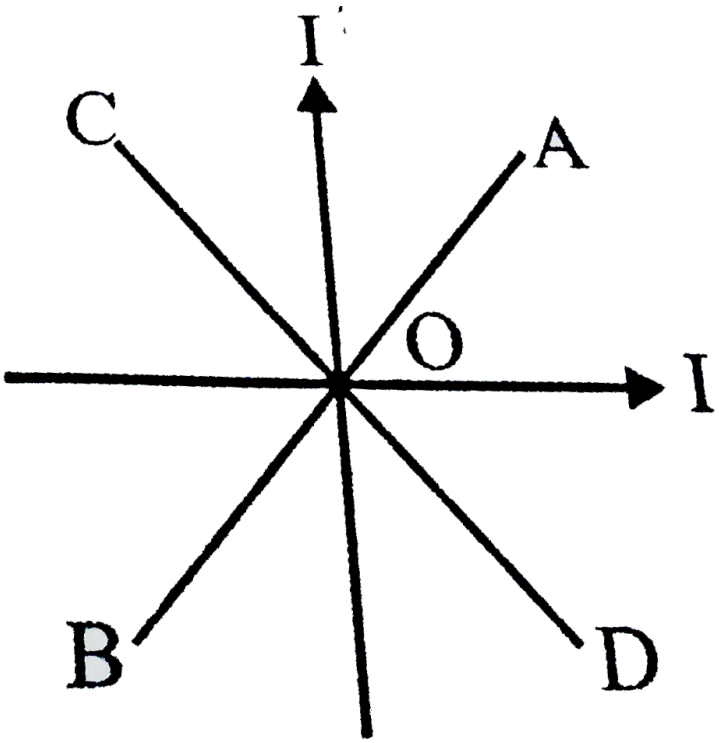
19. Two equal electric currents are flowing perpendicular to each other as shown in the figure. AB and CD are perpendicular to each other and symmetrically placed with respect to the current flow. Where do we expect the

resultant magnetic field to be zero?



A. On AB

B. On CD

C. On both AB and CD

D. On boht OD and BO

Answer:

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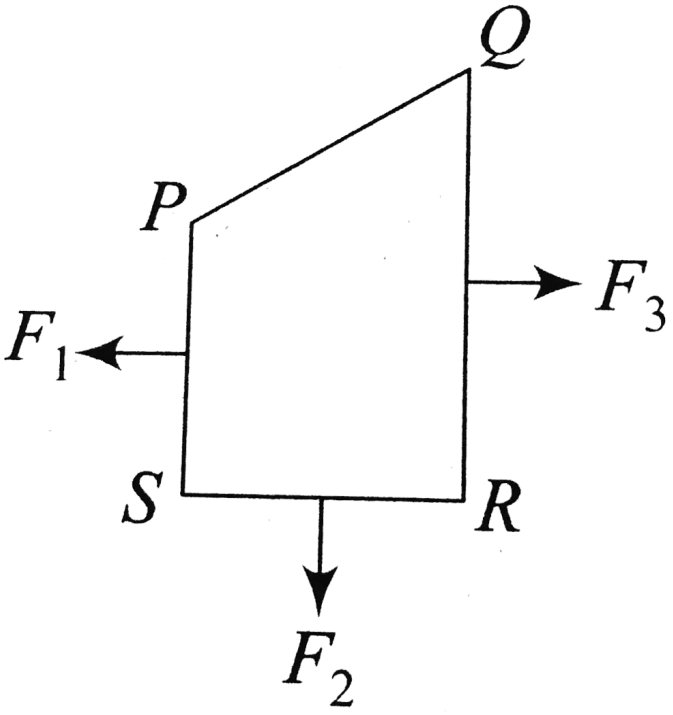
20. A closed loop $PQRS$ carrying a current is place in a unifrom magnetic forces on segments PS, SR and RQ are F_1, F_2 and F_3 respectively and are in the plane of the paper and along the directions shown, the force on

the segment QP is



A. $F_3 - F_1 - F_2$

B. $\sqrt{(F_3 - F_1)^2 + F_2^2}$

C. $\sqrt{(F_3 - F_1)^2 - F_2^2}$

D. $F_3 - F_1 + F_2$

Answer:

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21. 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 vlaue of the magnetic field is

A. 4B

B. B/2

C. B

D. 2B

Answer:

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22. A particle of charge q and mass m moves in a circular orbit or 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. ω, q and m

C. q and m

D. ω and m

Answer:

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23. A current loop in a magnetic field

A. can in equilibrium in one oreintation

B. can be in equilibrium in two orientations, both the equilibrium states are unstable

C. can be in equilibrium in two orientations, one stable while the other is unstable

D. experiences a torque wheter the field is uniform or non-uniform in all oreinetations

Answer:

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24. 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. $\mu_0 / 17$

B. $\sqrt{3}\mu_0 / 2\pi$

C. $\mu_0 / 2\pi$

D. $3\mu_0 / 2\pi$

Answer:

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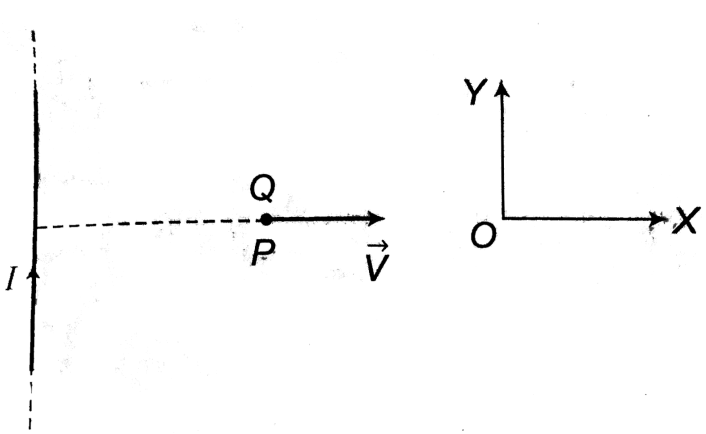
25. A very long straight wire carries a current I. At the instant when a charge $+Q$ at point P has velocity $\vec{V}$, as shown, the force on the

charge is



A. along OY

B. opposite to OY

C. along OX

D. opposite to OX

Answer:

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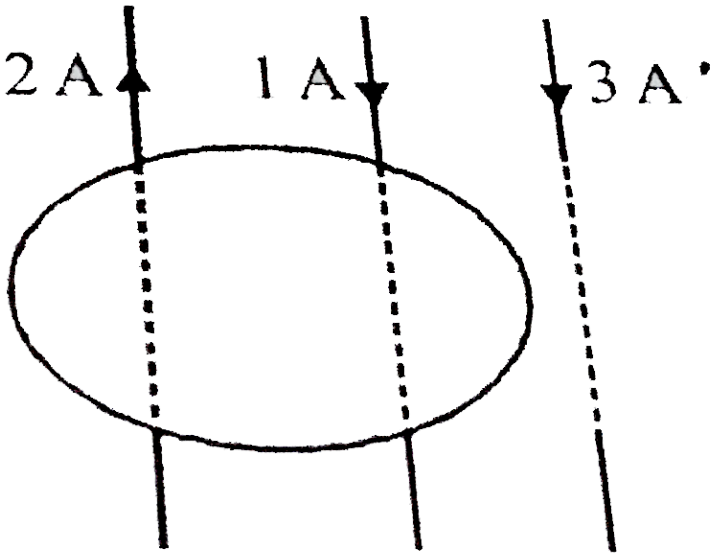
26. Two wires with currents 2A and 1A are enclosed in a circular loop. Another wire with current 3 A is situated outside the loop as shown. The $\oint veB.\,d\vec{I}$ around the loop is



A. μ_0

B. $3\mu_0$

C. $6\mu_0$

D. $2\mu_0$

Answer:

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27. 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. 1

B. 2

C. $1/2$

D. 4

Answer:

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28. A charged particle moves through a magnetic field perpendicular to its direction. Then

A. Kinetic energy changes but the momentum is constant

B. the momentum changes but the kinetic energy is constant

C. both momentum and kinetic energy of the particle are not. Constant.

D. both momentum and kinetic energy of the particle are constant.

Answer:

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29. The deflection in a galnometer falls from 50 divisions to 20 divisions, when a 12Ω shunt is applied. The galvanometer resistance is

A. 18ohm

B. 36ohm

C. 24ohm

D. 30ohm

Answer:

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30. When a long wire carrying a steady current is best into a circular coil of one turn, the magnetic induction at its centre is B. When the same wire carrying the same current is

bent into a circular coil of one turn, the magnetic induction at its centre is B. when the same wire carrying the same current is bent to form a circular coil of a turns of a smaller radius, the magnetic induction at the centre will be

A. B/n

B. nB

C. B/n^2

D. n^2B

Answer:

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

A. $125\mu T$

B. $150\mu T$

C. $250\mu T$

D. 75muT`

Answer:

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32. A charge moving with veloity 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:

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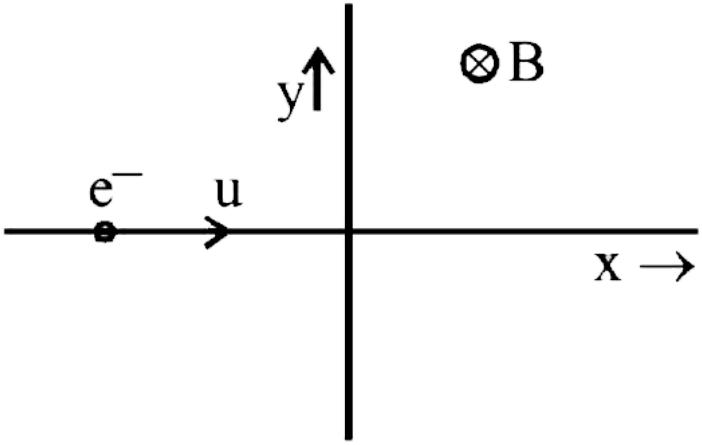
33. An electron travelling with a spped u along the positive x-axis enters into a region of magnetic field where $B = -B_0\widehat{K}(x > 0)$. It

comes out of the region with speed v then



A. v=u at $y > 0$

B. v=u at $y < 0$

C. $v > u$ at $y > 0$

D. $v > u$ at $y < 0$

Answer:

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34. If an ammeter is to be used in place of a voltmeter, then we must connect with the ammeter a

A. low resistance in parallel

B. high resistance in parallel

C. high resistance in series

D. low resistance i series

Answer:

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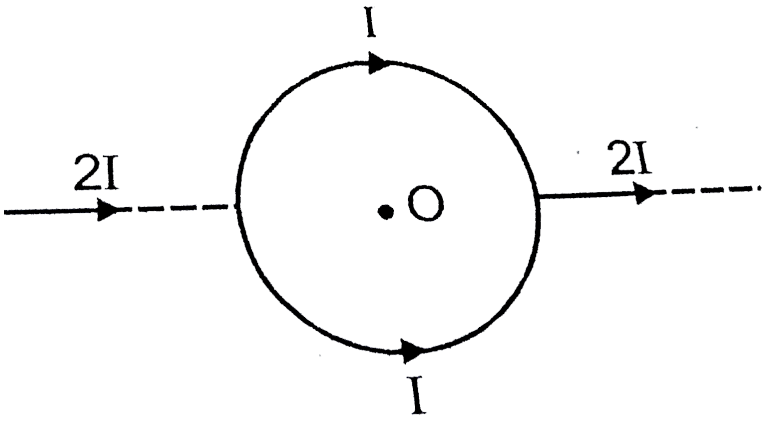
35. An infinite straigh conductor carrying current 2 I is split into a loop of radius r as shown in fig. the magnetic field at the centre of the coil is



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

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

C. $\frac{\mu_0}{4\pi})\frac{(\pi+1)}{r}$

D. zero

Answer:

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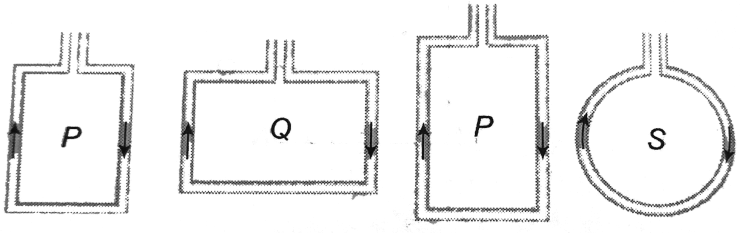
36. Four wires each of length 2.0 meters area bent into four loops P, Q, R and S and then suspended into uniform magnetic field. Same current is passed in each loop. Which

statement is correct?



A. P

B. Q

C. R

D. S

Answer:

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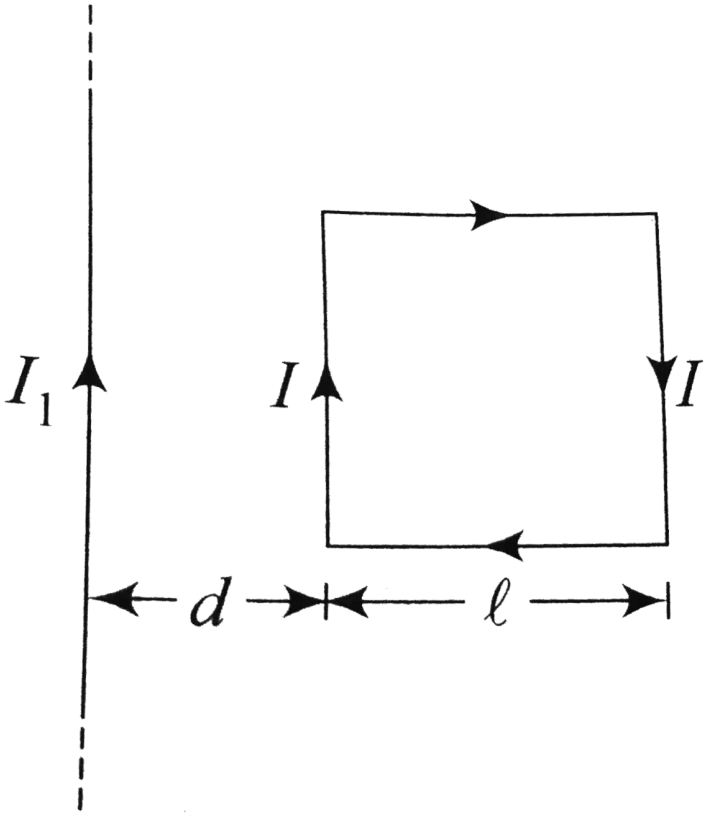
37. A square loop, carrying a steady 1, is placed in a horizontal plane near a long staright conductor carryinf a steady current I, at a distance d from the conductor as shown in

Fig. The loop wil experience



A. a net repulsive force away from the conductor

B. a net torque acting upward perpendicular to the horizontal plane

C. a net torque acting downward normal to the horizontal plane

D. a net attractive force towards the conductor.

Answer:

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38. Two coaxial solenoids of different radius carry current I in the same direction. $\overrightarrow{F_1}$ be the magnetic force on the inner solenoid due to the outer one and $\overrightarrow{F_2}$ be the magnetic force on the outer solenide due to the inner one. Then

A. $\overrightarrow{F}_1$ is radially inwards and $\overrightarrow{F}_2$=0

B. $\overrightarrow{F}_1$ is radially outwards and $\overrightarrow{F}_2 = 0$

C. $\overrightarrow{F}_1 = \overrightarrow{F}_2 = 0$

D. $\overrightarrow{F}_1$ is radially inwards and $\overrightarrow{F}_2$ is radially outwards

Answer:

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39. The AC voltage across a resistance can be measured using

A. hot wire voltmeter

B. moving coil galvanometer

C. potential coil galvanometer

D. moving magnet galvanometer

Answer:

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40. When a charged particle moving with velocity $\overrightarrow{V}$ is subjected to a magnetic field of induction $\overrightarrow{B}$ the force on it is non-zero. This implies that:

A. angle between $\vec{v}$ and $\vec{B}$ is necessarly 90°

B. angle betwwen $\vec{v}$ and $\vec{B}$ can have any value other thatn 90°

C. angle between $\vec{v}$ and $\vec{B}$ can have any value other than zero and 180°

D. angle between $\vec{v}$ and $\vec{B}$ is either zero or 180°

Answer:

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