PHYSICS

BOOKS - MARVEL PHYSICS (HINGLISH)

MAGNETIC EFFECT OF ELECTRIC CURRENT

Mcq Standard Level

1. The magnetic field $\left(d\vec{B}\right)$ at a point due to an elemental conductor $\left(d\vec{l}\right)$ carrying a

current (i) at a distance $\left(\overrightarrow{r}\right)$ from the elemetn, is given by

A. Faraday's Law

B. Columb's Law

C. Biot-Savart's Law

D. Ampere's Law

Answer: C

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2. Tesla is a unit for measuring

A. magnetic flux

B. magnetic field

C. magnetic induction

D. magnetic moment

Answer: C

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3. 1 testa is equal to

A. 1 NA m

B. 1 Nm/A

C. 1 NA/m

D. 1N/Am

Answer: D

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4. 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. 45°

C. 90°

D. 180°

Answer: C

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5. The magnetic field $d\vec{B}$ due to a small current element $d\vec{l}$ at a distance $\vec{r}$ and element carrying current i is,

A. $d\vec{B}\left(= \frac{\mu_0}{4\pi} I\left(\frac{d\vec{l} \times \vec{r}}{R} \right) \right.$

B. $d\vec{B} = \frac{u_0}{4\pi} i^2 \left(\frac{d\vec{l} \times \vec{r}}{r^2} \right)$

C. $d\vec{B} = \frac{\mu_0}{4\pi} i^2 \left(\frac{d\vec{l} \times \vec{r}}{r} \right)$

D. $d\vec{B} = \frac{\mu_0}{4\pi} I\left(\frac{d\vec{l} \times \vec{r}}{r^3} \right)$

Answer: D

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6. A small currnet-carrying element of 1 cm carries a current 4 A. The magnetic field induction due to the current element at a distancwe 10 cm from it is 2×10^{-7}. T. What is the angle between the direction of the current and the line joining the current elemetn to the point ?

[Take $\mu_0 = 4\pi \times 10^{-7} Wb^{-1} m^{-1}$]

A. 90°

B. 60°

C. 45°

D. 30°

Answer: D

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7. The direction of magnetic field due to a current carrying conductor can be determined by Ampere's _____rule.

A. Fleming left hand rule

B. Right hand thumb rule

C. Jouls's law

D. Ampers's law

Answer: B

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8. A current of 10 A is folowing in a long stright wirre. What is the magnetic incucation produced at a distance of 0.2 m ?

A. $2 \times 10^{-5} Wb/m^2$

B. $10^{-5} Wb/m^2$

C. $3 \times 10^{-5} Wb/m^2$

D. $4 \times 10^{-5} Wb/m^2$

Answer: B

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9. What is the current in a straight wire, if a magnetic field of $10^{-6} W/m^2$ is produced at a distance of 2 cm from it ?

A. $0.1A$

B. $0.2A$

C. $0.5A$

D. $0.4A$

Answer: A

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10. An electric current passes through a long straight copper wire. At a distance of 5 cm from the straight wire, the magnetic field is B.

What is the magnetic field at a distance of 20 cm from the wire ?

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

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

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

D. $\frac{B}{5}$

Answer: C

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11. 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. $3.33 \times 10^{-4}T$

B. $1.11 \times 10^{-4}T$

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

D. $9 \times 10^{-3}T$

Answer: A

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12. 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 fiest value

B. Same as the first value

C. One-half of the first value

D. One-quarter of the first value

Answer: B

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13. At what distance from a long straight wire carrying current of 12A will be the magnetic field be the equal to $3 \times 10^{-5}(Wb) / \left(m^2\right)$?

A. $8 \times 10^{-2} m$

B. $12 \times 10^{-2} m$

C. $18 \times 10^{-2} m$

D. $24 \times 10^{-2} m$

Answer: A

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14. What is the magnetic induction at a distance of 5 cm from a straight wire carrying a current of 5 mA ?

A. $4 \times 10^{-8} Wb/m^2$

B. $3 \times 10^{-8} Wb/m^2$

C. $2 \times 10^{-8} Wb/m^2$

D. $5.5 \times 10^{-8} Wb/m^2$

Answer: C

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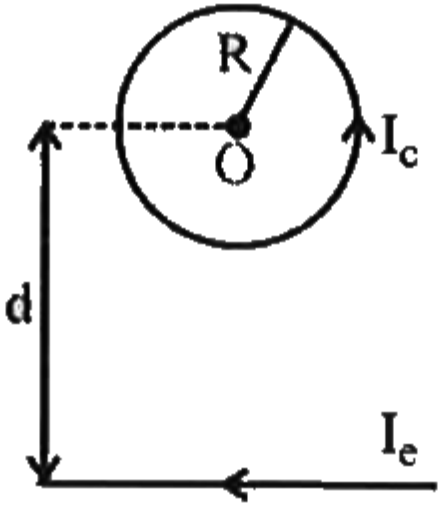
Mcq Higher Level

1. A circular loop of a wire and long straight wire carry currents I_c and I_e respectively as shown in the figure. Assume that they are placed in the same plane. For what value of d, the net magnetic field will be zero at the

centre O of the loop ?



A. $\frac{I_e R}{I_c \pi}$

B. $\frac{I_c R}{I_{e\pi}}$

C. $(I_c R)(I_e R)$

D. $\frac{I_e R}{I_c R}$

Answer: A

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2. A horizontal overheadpowerline is at height of $4m$ from the ground and carries a current of $100A$ from east to west. The magnetic field directly below it on the ground is $(\nu_0 = 4\pi \times 10^{-7} TmA^{-1}$

A. 2.5×10^{-7} T southward

B. 2.5×10^{-7} T Northward

C. 5×10^{-6} T southward

D. 5×10^{-6} T Northward

Answer: C

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3. Two identical conducting wires AOB and COD are placed at right angles to each other. The wire AOB carries an electric current I_1 and COD carries a current I_2. The magnetic field on a point lying at a distance d

from O, in a direction perpendicular to the plane of the wires AOB and COD, will be given by

A. $\frac{\mu_0}{2\pi d}(I_1 + I_2)$

B. $\frac{\mu_0}{2\pi d}(I_1^2 + I_2^2)$

C. $\frac{\mu_0}{2\pi d}(O_1^2 + I_2^2)$

D. $\frac{\mu_0}{2\pi d}\left(\frac{I_1^2 + I_2^2}{d}\right)^{1/2}$

Answer: C

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Mcq Standard Level

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

A. East-West

B. North-South

C. at 45° with E-W directions

D. In any direction

Answer: B

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2. The electric current in a circular coil of two turns produced a magnetic induction of 0.2 T at its centre. The coil is unwound and then rewound into a circular coil of four turns. If same current flows in the coil, the magnetic induction at the centre of the coil now is

A. 0.4 T

B. $0.8T$

C. 1.2 T

D. 1.6 T

Answer: D

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3. The magnetic fiedl at the cetre of a circular loop of diameter 0.1 m and carrying a current of 1 A is

A. $2.5 \times 10^{-5} T$

B. $1.25 \times 10^{-5} T$

C. $3.8 \times 10^{-5} T$

D. $4.6 \times 10^{-5} T$

Answer: B

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4. Two current carying circular coils A and B, having the same number of turns are connected in series. What is the ratio of the magnetic inductions produced at their

centres, in the diameters of A and B are 10 cm and 20 cm respectively ?

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

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

C. $2:1$

D. $3:1$

Answer: C

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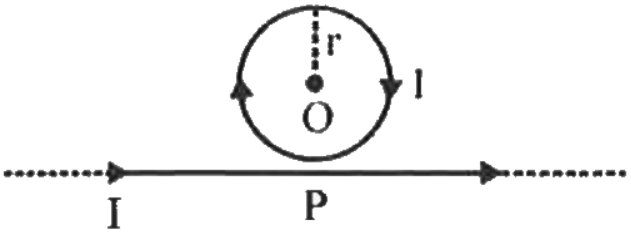
5. In the following figure the circular coil carrying current I is not supposed to touch at point P on the straight conductor carrying same currnet I



The magnitude of magnetic induction B at the centre 'O' of the circular coil will be

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

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

C. $\frac{\mu_0 I}{2r}\left(1+\frac{1}{\pi}\right)$

D. $\frac{\mu_0 I}{2r}$

Answer: C

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6. 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. $\frac{1}{r^4}$

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

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

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

Answer: B

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

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

C. Zero

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

Answer: C

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8. 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. $6.28W\frac{b}{m^2}$

B. $9Wb/m^2$

C. $12.56Wb/m^2$

D. $15Wb/m^2$

Answer: C

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9. Two circular coils are made of two identical wires of same length and carry same current. If the number of turns of the two coils are 4 and 2, then the ratio of magnetic induction at the centres will be

A. $2:1$

B. $1:2$

C. $1:4$

D. $4:1$

Answer: D

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10. What is the magnetic induction at the centre of a circular coil of 10 turns, each of radius 5 cm and carrying a current of 5 A ?

A. $4.5 \times 10^{-4} Wb/m^2$

B. $5.2 \times 10^{-4} Wb/m^2$

C. $6.284 \times 10^{-4} Wb/m^2$

D. $8.45 \times 10^{-4} Wb/m^2$

Answer: C

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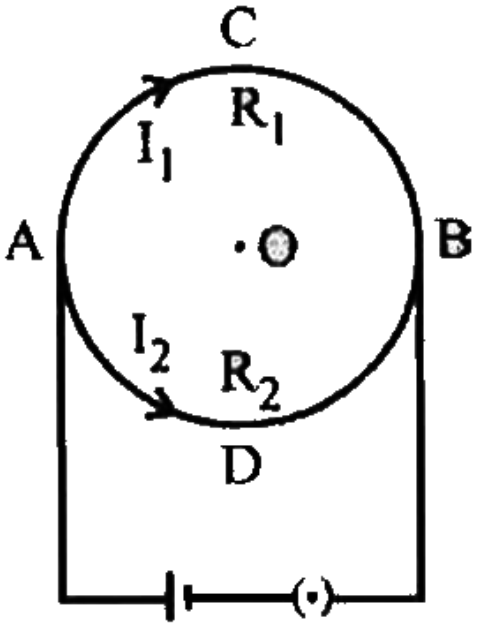
11. A and B are any two points on a current loop carrying a current. A butter of e.m.f (E) and negligible internal resistance is connected across AB. What is the resultant magnetic

induction at the centre of the coil ?



A. $5Wb/m^2$

B. $2.5Wb/m^2$

C. Zero

D. $7Wb/m^2$

Answer: C

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12. A wire of length $10cm$ is bent into an arc of a circle such that it subtends an angle of 1 radian at the centre. If a current of $1A$ is passed through the wire, the magnetic induction at the centre of the circle will be

A. $6.284 \times 10^{-6} Wb/m^2$

B. $4.284 \times 10^{-6} Wb/m^2$

C. $3.14 \times 10^{-6} Wb/m^2$

D. $1.57 \times 10^{-6} Wb/m^2$

Answer: A

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13. A circular coil of one turn carries a current I. The same wire is then bent to from a smaller circular coil of 2 turns and the same current is passed through it. What is the relations

between the fields at the centre of the coils in the second and first case ?

A. $B_2 = B_1$

B. $B_2 = 2B_1$

C. $B_2 = \frac{B_1}{2}$

D. $B_2 = 4B_1$

Answer: D

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14. A coil of 10 cm radius, carrying a current of 1 A produces magnetic field of induction $6.284 \times 10^{-3} Wb/m^2$ at its cente. What is the number of turns of the coil ?

A. 100

B. 200

C. 500

D. 1000

Answer: D

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15. A current carrying conductior of length 2 m is bent in the form of an orc of a circle of radius 80 cm. The magnetic induction at the centre of curvature of the arc is found to be $2 \times 10^{-6} Wb/m^2$. What is the current following through the conductor ?

A. $3.2A$

B. $6.4A$

C. $4.8A$

D. $9.6A$

Answer: B

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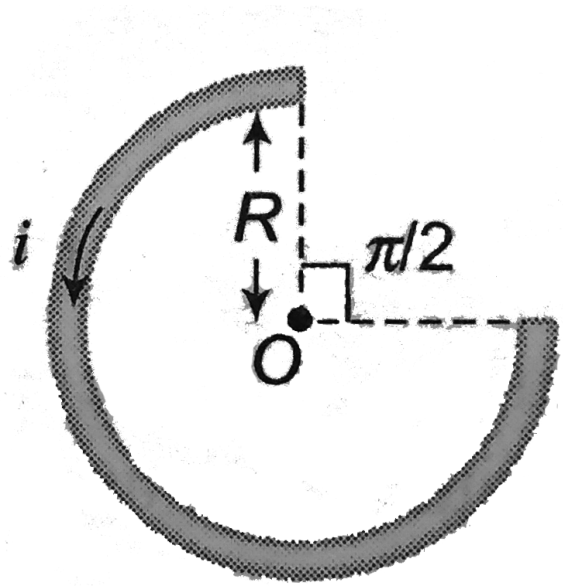
16. A current i ampere flows in a circular arc of wire whose radius is R, which subtend an angle $3\pi/2$ radian at its centre. The magnetic

induction B at the centre is



A. $\frac{3}{8}\frac{\mu_0 i}{\text{®}}$

B. $\frac{8}{3}\frac{\mu_0 i}{r}$

C. $\frac{3}{4}\frac{\mu_0 i}{r}$

D. $\frac{5}{8}\frac{\mu_0 i}{r}$

Answer: A

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17. What is the magnetic field intensity produced at the centre O, due to the current carrying wire shown in the figure ?

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

B. $B = \frac{\mu_0}{4\pi}\left(\frac{2\pi l}{R} + 2L\right)$

C. $B = \frac{1}{2}\left[\frac{\mu_0}{4\pi}\left(\frac{2\pi I}{2}\right)\right]$

D. $B = 2\left[\frac{\mu_0}{4\pi}\left(\frac{2\pi I}{R}\right) + 2L\right]$

Answer: C

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18. 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

B. $1/2$

C. 2

D. 1

Answer: D

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19. 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. $75\mu T$

B. $125\mu T$

C. $150\mu T$

D. $250\mu T$

Answer: D

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20. Two concentric coils each of radius equal to 2π cm are placed at tight angles to each there. 3 A and 4 A are the currents flowing in each coil respectively.

The megnetic induction in Wb/m^2 at the centre of the coil will be $\left(\mu_0 = 4\pi \times 10^{-7} Wb/Am\right)$

A. 7×10^{-5}

B. 5×10^{-5}

C. 10^{-5}

D. 12×10^{-5}

Answer: B

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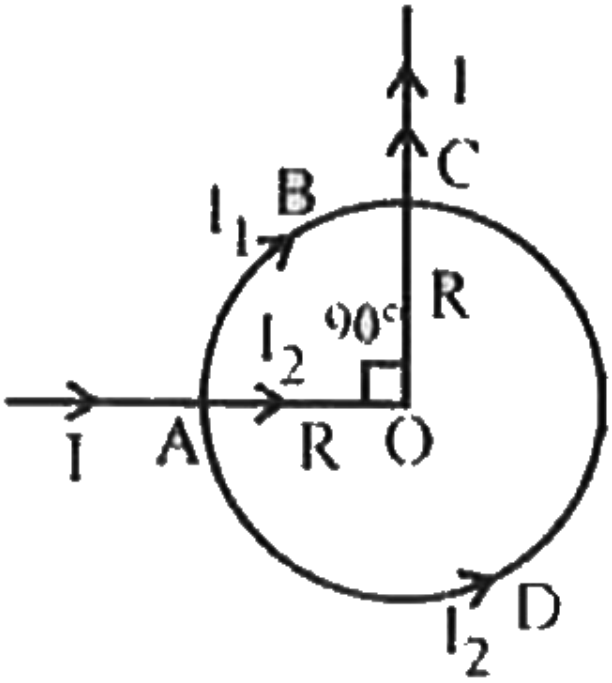
21. A current I enters a circlar coil of radius, R, branches into two parts and then recombines as shown in the figure, What is the resultant

magnetic field at the centre of the coil ?



A. zero

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

C. $\frac{1}{4}\left(\frac{\mu_0 I}{2R}\right)$

D. $\frac{3}{4}\left(\frac{\mu_0 I}{2R}\right)$

Answer: A

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22. What should be the current in a circular coil of radius 5 cm to annule $B_H = 5 \times 10^{-5} T$?

A. $0.4A$

B. $4A$

C. $40A$

D. $1A$

Answer: B

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23. 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 $(1/8)^{th}$ of its value at the centre of the coil is,

A. $sqrr3R$

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

C. $\left(\frac{2}{\sqrt{3}}\right)R$

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

Answer: A

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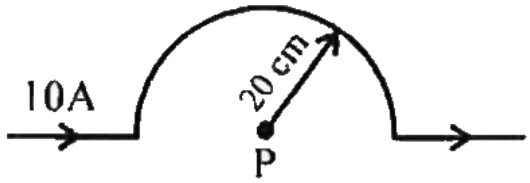
24. A current of 10 A is pasing through a long wire which has semicircular loop of radius 20 cm as shown in the figure. What is the magnetic field prioduced at the centre of the

loop ?



A. $10\pi\mu T$

B. $5\pi\mu T$

C. $4\pi\mu T$

D. $2\pi\mu T$

Answer: B

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

A. $10^{-3}\mu_0$

B. $10^{-11}\mu_0$

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

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

Answer: D

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26. 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. propotation to $2(180^\circ - \theta)$

B. inversely proporational to r

C. zero, only if $\theta = 180^\circ$

D. zero, for all values of θ

Answer: D

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27. Two similar current loops are placed with their planes along x-axis and y-axis respectively. Then the ratio of resultant

magnetic field at a common point X to the individual magnetic field is

- $\sqrt{2}:1$
- $1:\sqrt{2}$
- $3:2$
- $\sqrt{3}:\sqrt{2}$

Answer: A

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28. The two linear parallel conductors carrying currents in the opposite direction.....

each other.

A. attract each other

B. repel each other

C. do not affect each other

D. may attract or repel each other depending upon their materials

Answer: B

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29. Two long parallel wires are at a disttance of 1 m. Both of them carry one ampare of current in the same direction. What is the factor of attraction per unit length between the two wores ?

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

B. $2 \times 10^{-8} N/m$

C. $5 \times 10^{-8} N/m$

D. $10^{-7} N/m$

Answer: A

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30. Two parallel beams of positrons moving in the same direction will

A. be deflected normal to the plane containing the two beams

B. will not interact with each other

C. attract each other

D. repel each other

Answer: C

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31. If the distance between two current-carrying parallel wires is halved, then the force between them is

A. Doubled

B. Tripled

C. Quadrupled

D. Halved

Answer: A

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32. Two long parallel wires are separated by a distance of 2m. They carry a current of $1A$ each in opposite direction. The magnetic induction at the midpoint of a straight line connecting these two wires is

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

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

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

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

Answer: D

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33. Two long straight wires are set parallel to each other Each carries a current in the same directionand the separation between them is 2r. The intensity of the magnetic field midway between them is

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

B. Zero

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

D. $\frac{\mu_0 I}{2r}$

Answer: B

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34. Two long straight wires are arranged parallel to each other and are kept 10 cm apart in vacuum. They carry currents of 5A and 10A

respectively in the same direction. What is the magnetic force on a lergth of 20 cm of either wire ?

A. $10^{-5}N$

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

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

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

Answer: B

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

A. wxpand

B. remain same in length

C. be compressed

D. expand or get compressed, depending upon the direction of the current

Answer: C

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

A. repel each other with a force of $\left(\frac{\mu_0 I^2}{2\pi d^2}\right)$

B. attract each other with a force of $\frac{\mu_0 i^2}{(2\pi d^2)}$

C. rapel each other with a force of $\frac{\mu_0 i^2}{(2\pi d)}$

D. attract each other with a force of $\frac{\mu_0 i^2}{(2\pi d)}$

Answer: D

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

A. attract each other

B. reple each other

C. attracty or replel depending upon the strenghts of the currents

D. neither attract not repel

Answer: B

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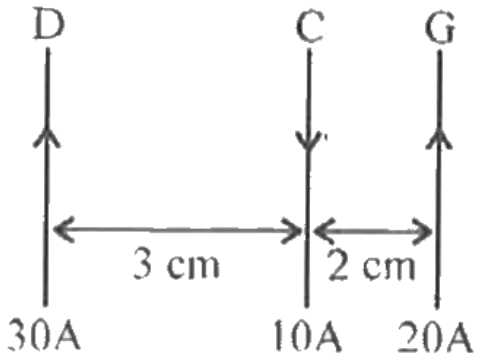
38. Three long, straight parallel wires, carrying current , aer arranged as shown in the figure. What is the force experienced by a 25 cm

length of wire C ?



A. $10^{-3}N$

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

C. zero

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

Answer: C

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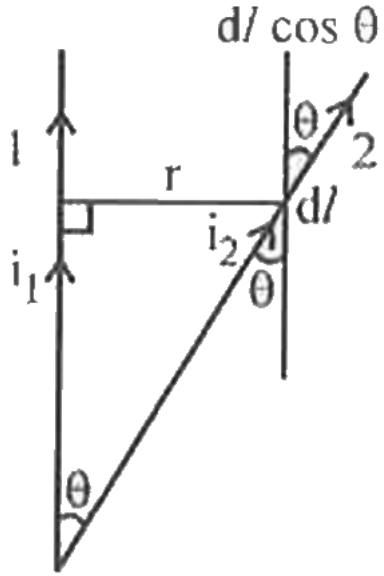
39. Wires 1 and 2 carrting i_1 and i_2 respectively are inclined at an angel θ to each other. What is the force on a smll element d/of wire 2 at a distnce r from wire 1 (as shown in

gifure) due to the magnetic field of wore 1 ?



A. $\frac{\mu_0}{2\pi r} i_1 i_2 dl \sin\theta$

B. $\frac{\mu_0}{2\pi r} i_1 i_2 dl \cos\theta$

C. $\frac{\mu_0}{2\pi r} i_1 i_2 dl \sin\theta$

D. $\frac{\mu_0}{2\pi r} i_1 i_2 dl \tan\theta$

Answer: B

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40. 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. $-F/3$

B. $-2F/3$

C. $F/3$

D. $-2F$

Answer: B

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41. Two parallel long wires carry currents $i_1 \text{and} i_2$ with $i_1 > i_2$.When the currents are in the same direction then the magnetic field

midway between the wires is $10\mu T$. when the direction of i_2 is reversed ,then it becomes $40\mu T$. then ratio of i_1/i_2 is

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

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

C. $\frac{3}{4}$

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

Answer: D

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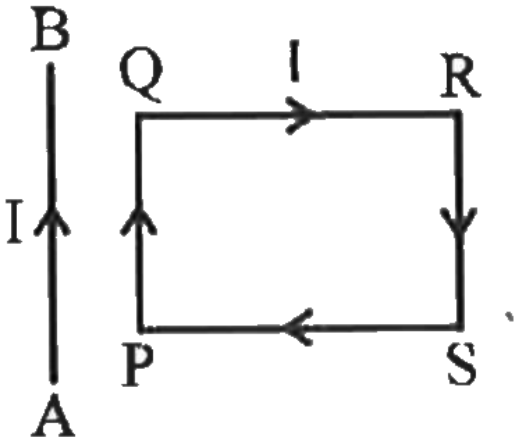
42. A reactangular loop carrrying a current I is situated near a long straight wire such that the wire is parallel to one of the sids of the loop. If steady current I is established in the wire as shown in figure, the loop will



A. rotate about an axis

B. move away from the wire

C. move towared the wire

D. remain stationary

Answer: C

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43. A circular coil of 20 turns each of radius 10 cm and carrying a current of 5 A is placed in a uniform magnetic field of induction 0.10 T normal to the plane of the coil?

A. 15 N-m

B. 3.14 N

C. Zero

D. 12.56 N

Answer: C

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44. A current carrying coil is subjected to a uniform magnetic field. The coil will orient so that its plane become

A. inclined at 45° to the magnetic field

B. inclined at any arbitray angle to the magnetic field

C. parallel to the magnetic field

D. perpendicular to magnetic field

Answer: C

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

A. are of loop

B. no. of turns in loop

C. shape of loop

D. strength of current and magnetic field

Answer: C


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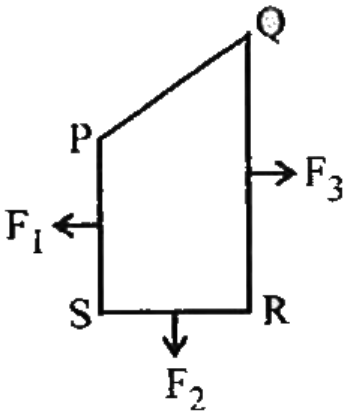
46. A closed loop PQRS carrying a current is placed in a uniform magnetic field. The field. The magnetic forces on segments PS, SR and PQ are F_1, F_2 and F_3 respectively and are in the plane of the paper and along the directions shown.

What is the force acting on the segment QP for the equilibrium of the loop ?



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: B

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Mcq Higher Level

1. What is the magnetic field at a distance R from a coil of radius r carrying current I ?

A. $\frac{\mu_0 nI}{4r}$

B. $\frac{\mu_0 nI}{8r}$

C. $\frac{\mu_0 nl}{16r}$

D. $\frac{\mu_0 nl}{32x}$

Answer: C

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2. Magnetic induction at the center of a circular loop carrying a current is $'B'$. If $'A'$ is the area of the coil, the magnetic dipole moment of the loop is

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

B. $\frac{2BA^{3/2}}{\mu_0\pi^{1/2}}$

C. $\frac{BA^{3/2}}{\mu_0\pi}$

D. $\frac{\mu_0\pi^{1/2}}{BA^{3/2}}$

Answer: B

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

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

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

Answer: C

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4. The current passing through a circular coil of two rurns produces a magnetic firld of $4\mu T$ as its centre. The coil is then rewound, so as to have four turns and the current passing through it is doubled. What is the new magnetic firld at the centre of the coil ?

A. $8\mu T$

B. $16\mu T$

C. $24\mu T$

D. $32\mu T$

Answer: D

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5. 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. $8A$

B. $4A$

C. $2A$

D. $1A$

Answer: A

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6. Two circular copper coils of radii 10 cm and 20 cm and having the same number of turns, are connected in parallel. The two copper wires have the same area of cross-section.

What is the ratio of the magnetic inductions at the centres of the coils ?

A. $2:1$

B. $3:1$

C. $4:1$

D. $5:1$

Answer: C

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7. A current of 0.5 A is passed through a coil of 200 turns and radius 10 cm. Another currwent carrying coil of 250 turns and radius 15 cm is kept concentric with the first and in the same plane. What is the current through the second coil if the net magnetic induction at teh centre of the coils is zero ?

A. $0.3A$

B. $0.4A$

C. $0.6A$

D. $0.8A$

Answer: C

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8. 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. n^2B

B. $2nB$

C. $2n^2B$

D. nB

Answer: A

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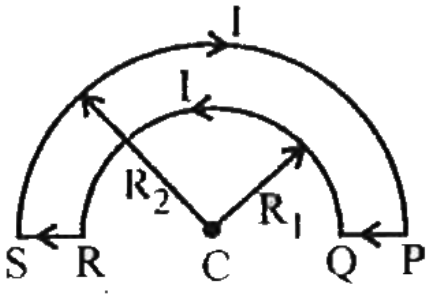
9. The wire loop PQRSP formed by joining two semicircular wires of radii R_1 and R_2 carries a current I as shown inh the figure. The megnitude of the magnetic induction at the

centreC is



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

B. $\frac{\mu_0 I}{2\pi}\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

C. $\frac{2\mu_0 I}{\pi}\left(\frac{1}{R_1}.\frac{1}{R_2}\right)$

D. $\frac{\mu_0 I}{4\pi}\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

Answer: D

View Text Solution

10. A circular coi9l of radius r and nuber of turns n cirries a current I. The fields at a small distance h along the axis of the coil and the at the centre of the coil are measured. What is the relation between B_{centre} and B_{axis}?

A. $B_c = B_{\text{axis}}\left(1 + \frac{h^2}{r^2}\right)$

B. $B_c = B_{\text{axis}}\left(1 + \frac{h^2}{r^2}\right)^{3/2}$

C. $B_c = B_{\text{axis}}\left(1 + \frac{h^2}{r^2}\right)^{3/2}$

D.

Answer: C

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11. What is the force acting on a moving charge in a uniform magnetic field? Discuss the cases when the force is maximum and minimum and define the unit of magnetic field $\vec{B}$.

A. 0°

B. 30°

C. 90°

D. 45°

Answer: C

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12. Write an expression in a vector form for the Lorentz magnetic force $\overrightarrow{F}$ on a charge Q moving with velocity $\overrightarrow{V}$ in a magnetic field $\overrightarrow{B}$. What is the direction of the magnetic force?

A. qVB

B. $\frac{BV}{q}$

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

D. Zero

Answer: D

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13. A wire of length 1 m is kept perpendicular to a magnetic field of 0.98 T. What is the

current folowing through the wire if a force of 1 kg weight acts on the wire

A. $1A$

B. $10A$

C. zero

D. $5A$

Answer: B

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14. A uniform electric field and a uniform magnetic field are acting along the same direction in a certain region. If an electron is projected along the direction of the fields with a certain velocity then

A. it will turn towards left of direction of motion

B. it will turn towards right of direacton of motion

C. its velocity will increase

D. its velocity will decrease

Answer: D

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15. A current- carrying straight wire is kept along the axis of a circular loop carrying a current. The straight wire

A. will exert an ineard force on the circular loop

B. will extra a force on the circular loop parallel to itself

C. will exert a force on the circular loop parallel to itself

D. will not exert any force on the circular loop

Answer: D

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16. 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. 2.4 N

B. 1.2 N

C. 3.0 N

D. 2.0 N

Answer: B

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17. 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 Y-Z plane

C. reatard along X-axis

D. move along a helical path around X-axis

Answer: A

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18. A charge q moves region in a electric field E and the magnetic field B both exist, then the force on its is

A. $q\left(\overrightarrow{v} \times \overrightarrow{B}\right)$

B. $q\overrightarrow{E} + q\left(\overrightarrow{v} \times \overrightarrow{B}\right)$

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

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

Answer: B

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19. 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 necessarily 90°

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

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

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

Answer: C

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20. An electron in a television picture tube travels at 3×10^7 m/s. It is subjected to a transverse magnetic field of $2 \times 10^{-3} Wb/m^2$. What is the magnitude of the lateral foce acting on the electron, due to the action of the magnetic field ?

Charge on the electron $= -1.6 \times 10^{-19} C$.

A. $4.8 \times 10^{-15} N$

B. $9.6 \times 10^{-15} N$

C. $7.2 \times 10^{-15} N$

D. $2.4 \times 10^{-15} N$

Answer: B

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21. A long wire carries a current of 5A. An electron at a distance of 50 cm from this wire is moving with a speed of 10^7 m/s What is the force acting on the electron, when it moves directly towards the wire ?

A. $3.2 \times 10^{-18} N$

B. $5 \times 10^{-17} N$

C. $6.4 \times 10^{-18} N$

D. $1.6 \times 10^{-18} N$

Answer: A

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22. A conductor of length 5 m and carrying current of 2 A is kept inclined at 30° to a uniform magnetic field of induction 0.4 tesla. What is the force acting on the conductor ?

A. 5 N

B. 4 N

C. 3N

D. 2 N

Answer: D

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23. A straight wore of mass 2 gram and length 50 cm is kept horizontal in a uniform magnetic field on induction $2 \times 10^{-2} Wb/m^2$. The field

is horizontal and is perpendicular to the length of the wire. How much current should be passed through wire, so to balance its weight ?

$(g = 10m/s^2)$

A. $1A$

B. $1.5A$

C. $2A$

D. 2.5 A

Answer: C

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24. A positive ion having charge $q = 3.2 \times 10^{-19} C,$ enters a uniform magnetic field of induction $10^{-2} W / bm^2,$ in a direction perpendicular to the field. If the force exerted by the field on the ions is $1.6 \times 10^{-16} N,$ then the speed with which the ion enters the field, is

A. $5 \times 10^3 m / s$

B. $5 \times 10^4 m / s$

C. $8 \times 10^5 m/s$

D. $6 \times 10^4 m/s$

Answer: B

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25. A wire 1 m long is kept perpendicular to a magnetic field of 0.01 tesla.

(i) What is the forde on the wire when it carries a current of 10A ?

(ii) What is the force on the wire if it is parallel to the magnetic field ?

A. $0.2N, 0.1N$

B. $0, 0.1N$

C. $0.1N$, zero

D. $0.5N, 0.2N$

Answer: C

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26. A conductor of length 2m, carrying a current of 10 A is kept in a magnetic field of induction $5 \times 10^{-4} Wb/m^2$. The conductor experiences a force of $5 \times 10^{-3} N$. What is the angle made by the conductor, with the direction of the field ?

A. 60°

B. 90°

C. 30°

D. 45°

Answer: C

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27. A straight wire of lengt 2m is kept horizontla in a uniform magnetic field of induction $4 \times 10^{-3} Wb/m^2$. The field is horizontal and is at right angles to the length of the conductor. It is found that the conductor remains balanced, if a current of 4.9 A is passed through the conductor. What is the mass of the wire ?

A. 4 gram

B. 5 gram

C. 6 gram

D. 8 gram

Answer: A

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28. A long straight wire carries a current of 10 A. An electron travels perpendicular to the plane of this wire at a distance 0.1 m with a

velocity of $5.0 \times 10^6 m/s$. What is the force acting on the electron due to the current in wire ?

A. $2.2 \times 10^{-17} N$

B. $1.6 \times 10^{-17} N$

C. $0.6 \times 10^{-17} N$

D. Zero

Answer: D

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

A. a force along the axis.

B. a force perpendicular to the axis

C. a force at an angle of 45° with the axis

D. no force

Answer: D

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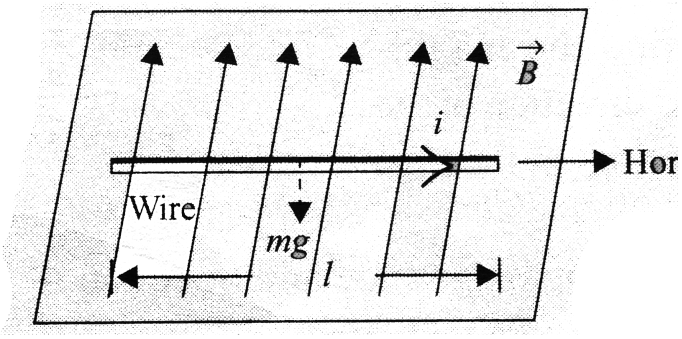
30. A straight wire of mass 200 g and length 1.5 m carries a current of 2 A. It is suspended in mid-air by a uniform horizontal magnetic field B. What is the magnitude of the magnetic field?



A. 2

B. 1.5

C. 0.55

D. 0.67

Answer: D

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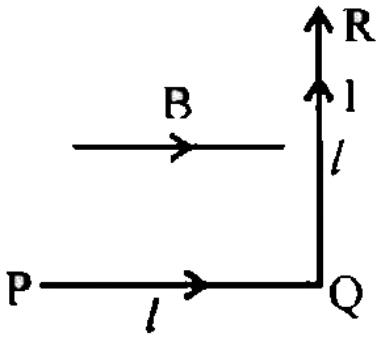
31. A wire PQR is bent as shown in the figure and is placed in a region of uniform magnetic field B. The length of $PQ = QR = l$. A current I ampere flows through the wire as shown.The magnitude of the forece on PQ and

QR will be



A. $BIl, 0$

B. $2Bl, 0$

C. $0, BIl$

D. $0, 0$

Answer: C

View Text Solution

32. What is the magnitude of magnetic force per unit length of a wire carrying a current of 5 A and making an angle of 30° with the direction of a uniform magnetic field of 0.1 T ?

A. $0.45N/m$

B. $0.35N/m$

C. $0.25N/m$

D. $0.55N/m$

Answer: C

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33. An α particel is projected with a velocity of 10^7 m/s, in a unifform magnetic fiedl on inductin, $1.2 \times 10^{-6} Wb/m^2$, in a direction perpendicular to the field. If the lateral force acting on the particle is $3.84 \times 10^{-18} N$, what is the charge onn the a particle ?

A. $1.6 \times 10^{-19} C$

B. $2.4 \times 10^{-19} C$

C. $3.2 \times 10^{-9} C$

D. $4 \times 10^{-19} C$

Answer: C

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34. There is a uniform electric field of strength $10^3 V/m$ along y-axis. A body of mass $1g$ and charge $10^{-6} C$ is projected into the field from origin along the positive x-axis with a velocity

$10m/s$. Its speed in m/s after $10s$ is (Neglect gravitation)

A. 10

B. $5\sqrt{2}$

C. $10\sqrt{2}$

D. 20

Answer: C

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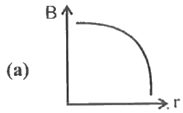
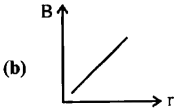
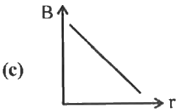
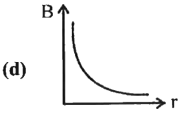
Mcq Graphical Mcqs

1. Which one of the following graphs shows the variation of magnetic induction B which distance r from a long wire carrying a current ?

A. 

B. 

C. 

D. 

Answer: D

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2. The graph of force per unit legth between two long parallel current carrying conductors and the reciprocal of the distance between them is

A. a parabola

B. a circle

C. a reactangular hyperbola

D. a straight line

Answer: D

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Test Your Grasp

1. 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. $3.33 \times 10^{-4} T$

B. $1.11 \times 10^{-4} T$

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

D. $9 \times 10^{-3} T$

Answer:

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2. Two circular coils are made of two identical wires of same length and carry same current. If the number of turns of the two coils are 4 and

2, then the ratio of magnetic induction at the centres will be

A. $2:1$

B. $1:2$

C. $1:4$

D. $4:1$

Answer:

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3. An α particles is projected with a velocity of 10^7 m/s, in a uniform magnetic field of induction, $1.2 \times 10^{-6} Wb/m^2$, in a direction perpendicular to the field. If the lateral force action on the particle is $3.84 \times 10^{-18} N$, what is the change on the a particle ?

A. $1.6 \times 10^{-19} C$

B. $2.4 \times 10^{-19} C$

C. $3.2 \times 10^{-19} C$

D. $4 \times 10^{-19} C$

Answer:

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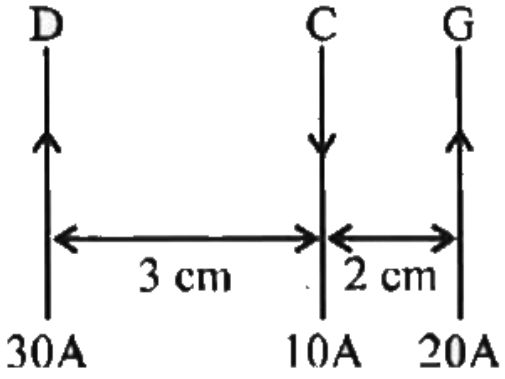
4. Three long, straight parallel wires, carrying currents, are arraanged as shown in the figure. What is the force experienced by a 25 cm lengtth of wire C?



A. $10^{-3}N$

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

C. zero

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

Answer:

View Text Solution

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

A. area of loop

B. no. of turns in loop

C. shape of loop

D. strength of current and magnetic field

Answer:

 Watch Video Solution

6. A current carrying metal wire of diameter 2 mm produces a maxiumum magnetic field of

magnitude 4×10^{-3} T. What is the current in the wire ?

A. $5A$

B. $10\sqrt{2}A$

C. $15A$

D. $20A$

Answer:

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7. The magnitude of magnetic field at a point due to a current carrying small element of a conductor does not depend upon

A. currnt in the element

B. diameter of the element

C. length of the element

D. distance of the point from the element

Answer:

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8. Using mass (M), length (L), time (T) and current (A) as fundamental quantities, the dimension of permittivity is:

A. $\left[M^{-1}LT^{-2}A\right]$

B. $\left[ML^{-2}T^{-2}A^{-1}\right]$

C. $\left[MLT^{-2}A^{-2}\right]$

D. $\left[MLT^{-1}A^{-1}\right]$

Answer:

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9. If the scattering intensity of a liquid is 8 units at a wavelentth of 500 nm, then the scatering insensity at a wavelength of 400 nm will be approximately

A. 13 units

B. 16 units

C. 20 units

D. 24 units

Answer:

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10. Two similar coils each of radius r and no. of turns n are lying concentrically with their planes at right angle to each other. The corrents folowing in them are 1 A and $\sqrt{3}A$ respectively. What is the magnetic field at centre of the coils ?

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

B. $\frac{\mu_0 n}{\sqrt{3}\pi r}$

C. $\frac{\mu_o n}{r}$

D. $\frac{\sqrt{3}\mu_0 n}{r}$

Answer:

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