PHYSICS

BOOKS - NEET PREVIOUS YEAR (YEARWISE + CHAPTERWISE)

MAGNETIC EFFECT OF CURRENT

Exercise

1. A 250-turns recantagular coil of length 2.1 cm and width 1.25 cm carries a current of

$85\mu A$ and subjected to magnetic field of strength $0.85T$. Work done for rotating the coil by 180° against the torque is

A. $9.1\mu J$

B. $4.55\mu J$

C. $2.3\mu J$

D. 1.5μJ

Answer: a

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2. Three coplanar parallel wires, each carrying a current of 10 A along the same direction, are placed with a separation 5.0 cm between the consecutive ones. Find the magnitude of the magnetic force per unit length acting on the wires.

A. $\dfrac{\mu_0 i^2}{2\pi d}$

B. $\dfrac{2\mu_0 i^2}{\pi d}$

C. $\dfrac{\sqrt{2}\mu_0 i^2}{\pi d}$

D. $\dfrac{\mu_0 i^2}{\sqrt{2}\pi d}$

Answer: d

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3. A long staright wire of radius a carries a steady current I. The curent is unifromly distributed over its cross-section. The ratio of the magnetic fields B and B' , at radial distances $\frac{a}{2}$ and $2a$ respectively from the axis of the wire is:

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

B. 1

C. 4

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

Answer: b

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4. 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. n^2B

C. 2nB

D. $2n^2B$

Answer: b

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5. An electron is moving in a circular path under the influence fo a transerve magnetic field of $3.57 \times 10^{-2} T$. If the value of e/m is $1.76 \times 10^{141} C/kg$. The frequency of revolution of the electron is

A. 1 GHz

B. 100 MHz

C. 62.8 MHz

D. 6.28 MHz

Answer: a

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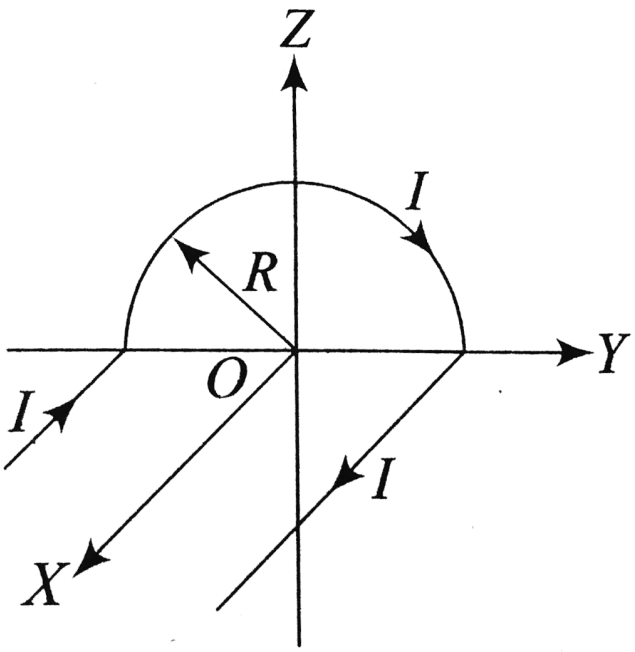
6. A wire carrying current I has the shape as shown in the adjoining figure. Linear parts of the wire are very long and parallel to X-axis while semicicular portion of radius R is lying

in $Y - Z$ plane. Magnetic field at point O is



A. $B = \frac{\mu_0}{4\pi}\frac{I}{R}\left(\pi\hat{i} + 2\hat{k}\right)$

B. $B = -\frac{\mu_0}{4\pi}\frac{I}{R}\left(\pi\hat{i} - 2\hat{k}\right)$

C. $B = -\frac{\mu_0}{4\pi}\frac{I}{R}\left(\pi\hat{i} + 2\hat{k}\right)$

D. $B = \frac{\mu_0}{4\pi}\frac{I}{R}\left(\pi\hat{i} - 2\hat{k}\right)$

Answer: a

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7. 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. $\frac{\mu_0 \mathrm{ne}}{2\pi r}$

B. zero

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

D. $\frac{\mu_0 \mathrm{ne}}{2r}$

Answer: d

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8. 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. $\frac{\mu_0}{2\pi d}\left(\frac{l_1}{l_2}\right)$

B. $\frac{\mu_0}{2\pi d}(l_1 + l_2)$

C. $\frac{\mu_0}{2\pi d}(l_1^2 - l_2^2)$

D. $\frac{\mu_0}{2\pi d}(l_1^2 + l_2^2)^{1/2}$

Answer: d

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9. When a proton is released from rest in a room, it starts with an initial acceleration a_0 towards west. When it is projected towards north with a speed v_0 it moves with an initial accelaration $3a_0$ towards west. The electric and the maximum possible magnetic field in the room

(i) $\frac{ma_0}{e}$, towards west

(ii) $\frac{2ma_0}{ev_0}$, downward

(iii) $\frac{ma_0}{e}$, towards east

(iv) $\frac{2ma_0}{ev_0}$, upward

A. $\frac{ma_0}{e}$ West, $\frac{2ma_0}{ev_0}$ up

B. $\frac{ma_0}{e}$ West, $\frac{2ma_0}{ev_0}$ down

C. $\frac{ma_0}{e}$ East, $\frac{2ma_0}{ev_0}$ up

D. $\frac{ma_0}{e}$ East, $\frac{2ma_0}{ev_0}$ down

Answer: b

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10. A current loop in a magnetic field

A. experiences a torque whether the field is uniform or non-uniform in all orientetions

B. can be in equilibirium in one orientation

C. can be equibilirium in two orientations, both the equibilirium states are unstable

D. can be in equilibirium in two orientations, one stable while other is unstable

Answer: d

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11. Two similar coils of radius R are lying concentriclaly with their planes at right angels to each other. The currents flowing in them are I and $2I$ respectively. The resulant magntic field induction at the centre will be

A. $\frac{\sqrt{5}\mu_0 /}{2R}$

B. $\frac{3\mu_0 /}{2R}$

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

D. $\frac{\mu_0 /}{R}$

Answer: a

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12. 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. $B = \frac{mv}{e} \text{and} K = 2m\pi^2 v^2 R^2$

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

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

D. $B = \frac{mv}{e} \text{and} K = m^2 \pi v R^2$

Answer: c

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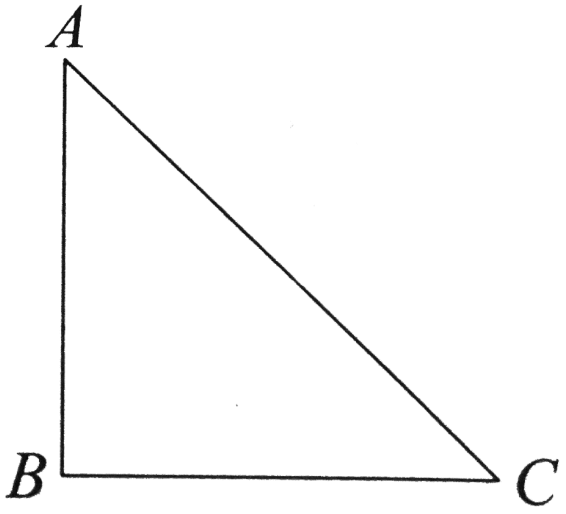
13. A current carrying closed loop in the from of a right angle isoseles triangle ABC is placed in a unifrom magnetic fild acting along AB. If the magnetic force on the arm BC is F, the force on the arm AC is



A. $-F$

B. F

C. $\sqrt{2}F$

D. $-\sqrt{2}F$

Answer: a

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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. speed will decrease

B. speed will increase

C. will run towards left of direction of motion

D. will turn towards right of direction of motion

Answer: a

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15. A beam of cathode rays is subjected to crossed electric (E) and magnetic fields (B). The fields are adjusted such that the beam is not deflected. The specific charge of the cathode rays is given by

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

B. $\frac{2VB^2}{E^2}$

C. $\frac{2VE^2}{B^2}$

D. $\frac{E^2}{2VB^2}$

Answer: d

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16. 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. 3F

B. $-F$

C. $-3F$

D. F

Answer: b

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17. The magnetic force acting on a charged particle of charge $-2\mu C$ in a magnetic field of $2T$ acting y direction, when the particle velocity is $\left(2i+3\hat{j}\right)\times 10^{6}ms^{-1}$, is

A. 8 N in z-direction

B. 4 N in z-direction

C. 8 N in y-direction

D. 8 N in z-direction

Answer: a

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18. A particle of mass m, charge q and kinetic energy T enters in a transverse uniform

magnetic field of induction B. After the 3 s, the kinetic energy of the particle will be

A. 3T

B. 2T

C. T

D. 4T

Answer: c

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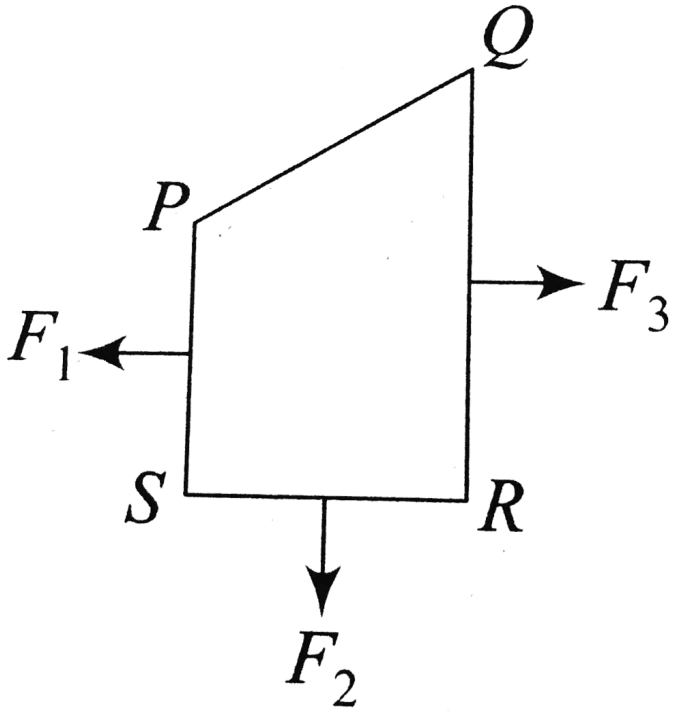
19. A closed loop $PQRS$ carrying a current is place in a unifrom magnetic forces on segments PS, SR and RQ are F_1, F_2 and F_3 respectively and are in the plane of the paper and along the directions shown, the force on

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: b

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20. A beam of electrons passes underfected throgh unifromly perpendicular electric and magnetic fields. If the electric fiedl is swiched off, and the same magnetic field is mainted fiedl is maintetained the electrons move:

A. in an elliptical orbit

B. in acircular orbit

C. along aparobolic path

D. along a straight line

Answer: b

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21. A charged particle (charge q) is moving in a circle of radius R with unifrom speed v. The associated magnetic moment μ is given by

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

B. qvR^2

C. $\frac{qvR_2}{2}$

D. qvR

Answer: a

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22. Under the influence of a unifrom magnetic field a charged particle is moving on a circle of radius R with Constnant speed v. The time period of the motion

A. depends on v and not on R

B. Depends on both R and v

C. is independent of both R and v

D. depends on R and not on v

Answer: c

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23. Two circular coils 1 and 2 are made from the same wire but the radius of the 1st coil is twice that of the 2nd coil. What is the ratio of

potentail difference applied across them so that the magnetic field at their centres is the same?

A. 3

B. 4

C. 6

D. 2

Answer: b

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24. 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 v and bB is necessery 90°

B. angle between v and B can have any value other than 90°

C. angle between v and B can have any value other than zero and 180°

D. angle between v and B is either zero or 180°

Answer: c

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25. 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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26. A coil in the shape of an equilateral triangle of side l is suspended between the pole pieces of a permanent magnet such that

$\overrightarrow{B}$ is in the plane of the coil. If due to a current i in the triangle a torque τ acts on it, the side l of the triangle is

A. $\frac{2}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)^{(1)/(2)}$

B. (2)/(sqrt3)((tau)/(Bi))

C. $(2)\left(\frac{\tau}{\sqrt{3}(Bi)}\right)^{(1)/(2)}$

D. $\frac{1}{\sqrt{3}}\frac{\tau}{Bi}$

Answer: c

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27. 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. 2B

B. 4B

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

D. B

Answer: d

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28. A charged particle moves through a magnetic field in a direction perpendicular to it. Then the

A. accelertion remain unchanged

B. velocity remnains unchanged

C. speed of particles remain unchanged

D. direction of particles remain unchanged

Answer: c

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

A. $q(v \times B)$

B. $qE + q(v \times B)$

C. $qB + q(B \times v)$

D. $qB + q(E \times v)$

Answer: B

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30. The magnetic field of a given length of wire carrying a current of a single turn circular coil at cebtre is B, then its value for two turns for the same wire when same current passing through it is

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

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

C. 2B

D. 4B

Answer: d

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

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

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

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

D. $\frac{qB}{2\pi E}$

Answer: b

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32. Current is flowing in acoil of area A and number of turns N, then magnetic moment of the coil ,M is equal to

A. NiA

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

C. $\frac{Ni}{\sqrt{A}}$

D. N^2Ai

Answer: a

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33. Two wires are held perpendicular to the plane of paper and are 5 m apart. They carry currents of 2.5 A and 5 A in same direction.

Then, the magnetic field strength (B) at a point midway between the wires will be

A. $\frac{\mu_0}{4\pi}T$

B. $\frac{\mu_0}{2\pi}T$

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

D. $\frac{3\mu_0}{4\pi}T$

Answer: b

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34. 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. 0.2 T

B. $2 \times 10^{-4}T$

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

D. $9.8 \times 10^{-4}T$

Answer: c

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

A. inside the pipe only

B. outside the pipe only

C. both inside and outside the pipe

D. no where

Answer: b

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36. Two long parallel wires are at a distance of 1 m. Both of them carry 1A of current. The force of attraction per unit length between the two wires is

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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37. A coil one turn is made of a wire of certain lenghth and then from the same length a coil of two turns is made. If the same current is passed both the cases, then the ratio of magnetic induction at there centres will be

A. $2:1$

B. $1:4$

C. $4:1$

D. $1:2$

Answer: b

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

A. conitinue to move due east

B. move in a circular orbit with its speed unchanged

C. move in a circular orbit with its speed increased

D. gets deflected vertically upwards

Answer: b

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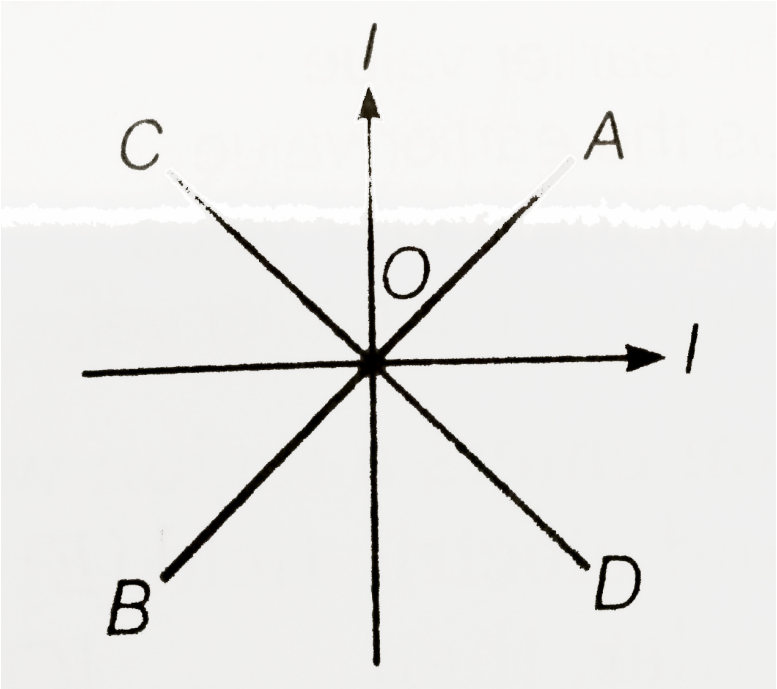
39. Two equal electroic currents are flowing perpendicular to each other as shown oin the figure. AB and CD are perpendicular to each other and symeetrically placed w.r.t the

currents, where do we except the resultant magnetic field to be zero ?



A. On AB

B. On CD

C. On both AB and CD

D. On both OB and BO

Answer: a

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40. A beam of electrons is moving with constant velocity in a region having simultaneous perpendicular electric and magnetic fields of strength $20Vm^{-1}$ and 0.5 T, respectively at right angles to the direction of

motion of the electrons. Then, the velocity of electrons must be

A. $8m/s$

B. $20m/s$

C. $40m/s$

D. $\frac{1}{40}m/s$

Answer: c

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

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

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

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

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

Answer: d

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42. A 10 eV electron circulating in a plane at right angle to a uniform field of magnetic induction $10^{-4} Wb/m^2$ $(=1.0\text{gauss})$. The orbital radus of electron is

A. 12 cm

B. 16 cm

C. 11 cm

D. 18 cm

Answer: c

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

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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44. A straight wire of diametre 0.5 mm carrying a current of 1 A is replaced by another wire of 1mm diametre carrying same current. The strenth of magnetic field far away is

A. twice the earlier value

B. same as the earlier value

C. one-half of the earlier value

D. one-quarter of the earlier value

Answer: b

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45. 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

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

A. torque is formed

B. emf is induced

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

D. None of the above

Answer: a

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47. 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 y-z plane

C. retard along x-axis

D. move along a helical path around x-axis

Answer: a

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48. 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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49. To convert galvanometer into ammeter which one of the following is connected with the coil:

A. low resistence in parallel

B. high resistence in parallel

C. low resistence in series

D. high resistence in series

Answer: a

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50. 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 T

B. 0.8 T

C. 0.1 T

D. 1.6 T

Answer: a

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51. 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. 2.0 cm

B. 0.5 cm

C. 4.0 cm

D. 1.0 cm

Answer: c

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52. 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. 25 KeV

B. 50 KeV

C. 200 KeV

D. 100 KeV

Answer: d

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53. 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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54. 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 arbitary angle to the magnetic field

C. parallel to the magnetic field

D. perpendicular to magnetic field

Answer: c

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55. Name the physical quantity whose unit is tesla. Hence define a tesla.

A. magnetic flux

B. magnetic field

C. magnetic induction

D. magnetic moment

Answer: c

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