PHYSICS

BOOKS - AAKASH SERIES

MOVING CHARGES AND MAGNETISM

PROBLEM

1. A magnetic field of $\left(4.0X10^{-3}\vec{k}\right)$ T exerts a force of $\left(4.0\vec{i}+3.0\vec{j}\right)X10^{-10}$ N on a particle having a charge of $1.0X10^{-9}$ C and going in the x-y plane. Find the velocity of the particle.

Watch Video Solution

2. A charged particle carrying charge $q = 1\mu c$ moves in uniform magnetic with velocity $v_1 = 10^6 m/s$ at angle 45° with x-axis in the xy-plane and experiences a force $F_1 = 5\sqrt{2}N$ along the negative z-axis. When te same particle moves with velocity $v_2 = 10^6 m/s$ along the z-axis it experiences a force F_2 in y-direction. Find

a. the magnitude and direction of the magnetic field

b. the magnitude of the force F_2.

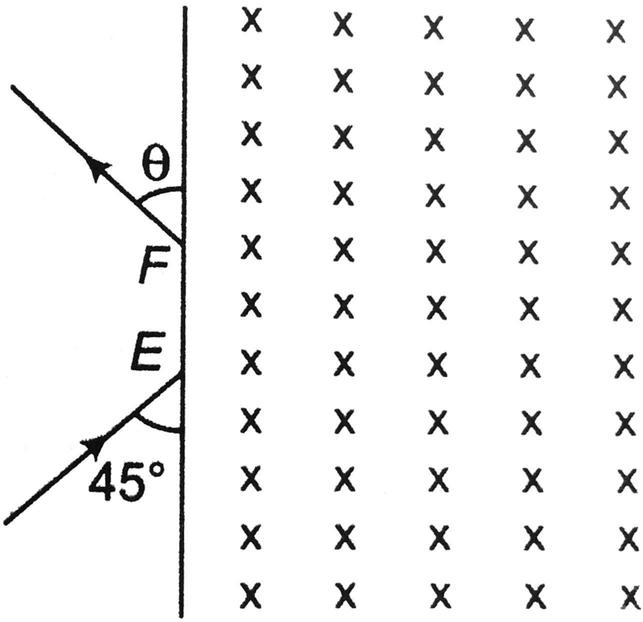
Watch Video Solution

3. If a particle of charge 1µC is projected into a magnetic field $\overrightarrow{B} = \left(2\hat{i} + y\hat{j} - z\hat{k}\right)$ T with a velocity $\overrightarrow{V} = \left(4\hat{i} + 2\hat{j} - 6\hat{k}\right)ms^{-1}$, then it passes undeviated. If it is now projected with a velocity $\overrightarrow{V} = \hat{i} + \hat{j}$, then find the force experienced by it?

Watch Video Solution

Watch Video Solution

4. A particle of mass $m = 1.6 \times 10^{-27}$ kg and charge $q = 1.6 \times 10^{-19} C$ enters a region of uniform magnetic field of stregth $1T$ along the direction shown in figure. The speed of the particle is $10^7 m/s$



a. The magnetic field is directed along the inward normal to the plane of the paper. The particle leaves the region of the fiedl at the point F. Find the distasnce EF and the angle theta.

b. If the direction of the field is along the outward normal to the plane of the paper find the time spent by the particle in the regin of the magnetic field after entering it at E.

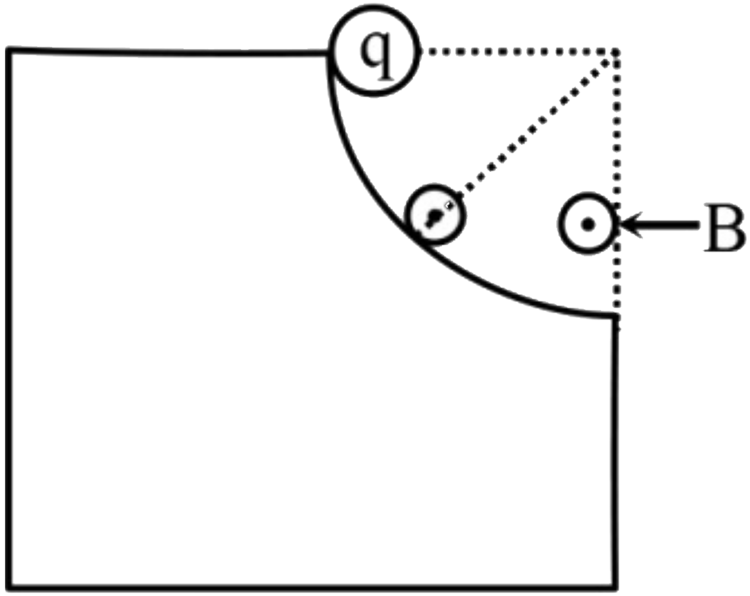
Watch Video Solution

5. An ionized gas contains both +ve and -ve ions which are initially at rest. The gas is subjected to $\overrightarrow{E}$ toward positive x-axis, magnetic field along +ve z axis. Then.find the direction of deflection of

a) +ve charged ions b) -ve charged ions

Watch Video Solution

6. In the figure , a charged sphere of mass m and change q starts sliding from rest on a vertical fixed circular track of radius R from the position shown. There exists a uniform and constant horizontal magnetic field of induction B. The maximum force exerted by the track on the sphere is -



Watch Video Solution

7. A particle of mass m and charge q is projected into a region having a perpendicular magnetic, field B. Find the angle of deviation of the particle as it comes out of the magnetic field if the, width of the region is b, which is very slightly less than $\frac{mv}{2Bq}$

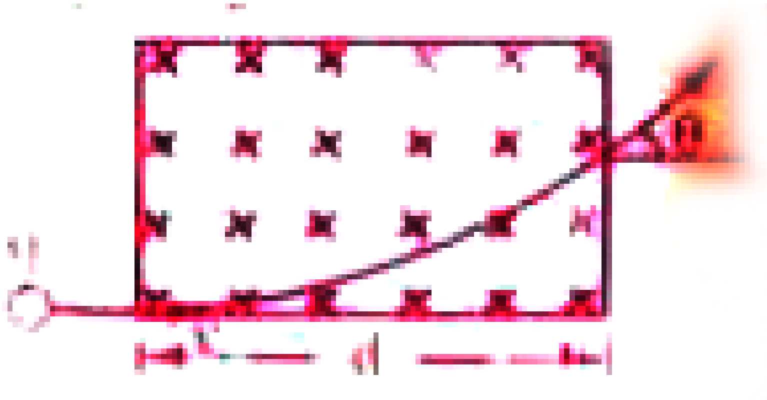
Watch Video Solution

8. A particle of mass m and charge q is projected into a region having a perpendicular magnetic, field B. Find the angle of deviation of the particle as it comes out of the magnetic field if the, width of the region is b, which is very slightly less than $\frac{mv}{2Bq}$

Watch Video Solution

9. A particle of mass m and charge q is projected into a region having a perpendicular magnetic field B. Find the angle of deviation of the particle as it comes out of the magnetic field if ihe width d of the region is

$\frac{2mv}{qB}$



Watch Video Solution

10. A particle of charge q, mass m is moving in an electric field $\overrightarrow{E} = E\hat{i}NC^{-1}$ and magnetic field $\overrightarrow{B} = B\hat{k}T$. It follows a trajectory from P to Q as shown Velocity at P is $V\hat{i}$ & that at Q is $-2V\hat{j}$, find

a) electric field strength

b) power developed at P by electric field

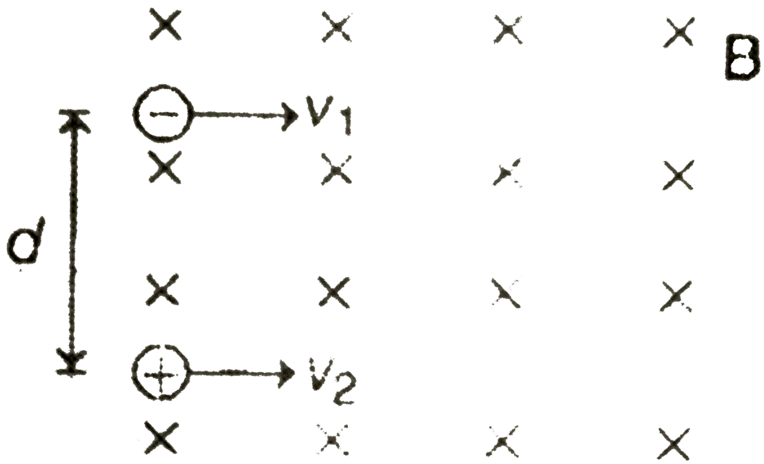
c) rate of work done at by both fields at Q

Watch Video Solution

11. A particle of specific charge α starts moving from (0,0,0) under the action of electric field $E = e\hat{i}$ and magnetic field $\overrightarrow{B} = B_0\hat{k}$. Its velocity at (x, 0, 0) is $4\hat{i} + 3\hat{j}$. Find the value of x

Watch Video Solution

12. Two identical particles having the same mass m and charges $+q$ abnd $-q$ separeted by a distance d enter in a unifrom magentic field B directed perpendicular to paper inwards with speeds v_1 and v_2 as shown in figure. The particles will not collide if (Ignore electrosatatic force)



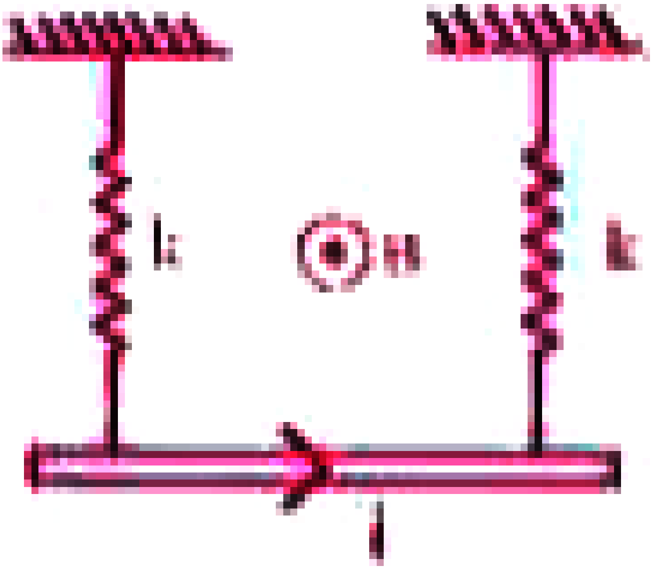
Watch Video Solution

13. A cyclotron's oscillator frequency is $10 MHz$. What should be the operating magnetic field fro accelerating protons? If the radius of its dees is $60 cm$, what is the kinetic energy (in MeV) of the proton beam produced by the acceleration?

$(e - 1.60 \times 10^{-19} C, m_p = 1.67 \times 10^{-27} kg, 1 MeV = 1.6 \times 10^{-13} J)$

Watch Video Solution

14. A current carrying conductor of mass m, length l carrying a current i hangs by two identical springs each of stiffness k. For an outward magnetic field B find the deformation of the springs. Put m=50 gm,. $g = 10m/s^2, l = \frac{1}{2}m, i = 1A$ and B=1 T and k=50 N/m



Watch Video Solution

15. Find the force experienced by the wire carrying a current 2A if the ends P and Q of the wire have coordinates (1,2,-3) m and

(-2,-5,1)m respectively when it is placed in a magnetic field $B = \left(\hat{i} + \hat{j} + \hat{k}\right)T$

Watch Video Solution

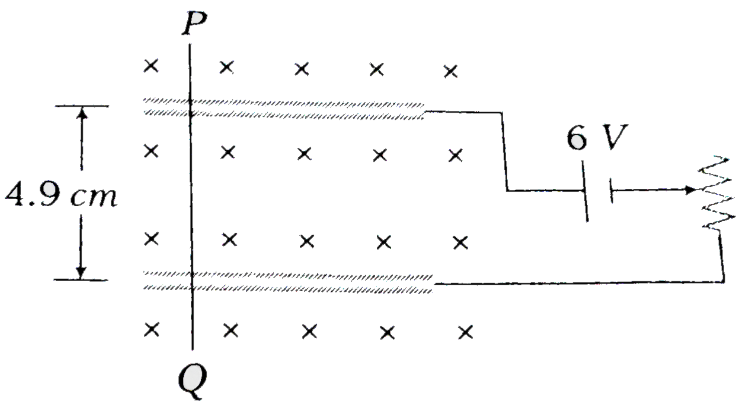
16. A rod CD of length b carrying a current I, is placed in a magnetic field due to a thin log wire AB carrying currrent I as shown in fig. Then find the net force experienced by the wire

Watch Video Solution

17. A rough inclined plane inclined at angle 37° with horizontal, has a metallic wire of length 20cm with its length $\perp$ to length, of inclined plane $(\mu = 0.1)$ When a current of i is passing through the wire and a magnetic field is applied normal to the plane upwards, the wire starts moving up with uniform velocity for B = 0.5T. Then find the magnitude of current i, (mass of the wire=50g)

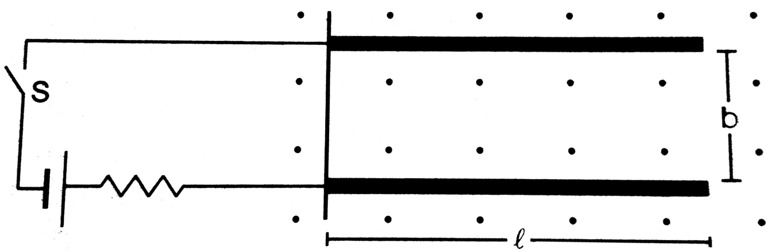
Watch Video Solution

18. A wire PQ of mass 10g is at rest on two parallel metal rails.The separation betweem the rails is 4.9 cm.A magnetic field if 0.80 T is applied perpendicular to the plane of the rails, directed downwads. The resisitance of the circuit is slowly decreased. When the resistance to bleow 10 Ω the wire PQ begins to slide on the rails .Calculate the coefficient of friction between the wire and the rails



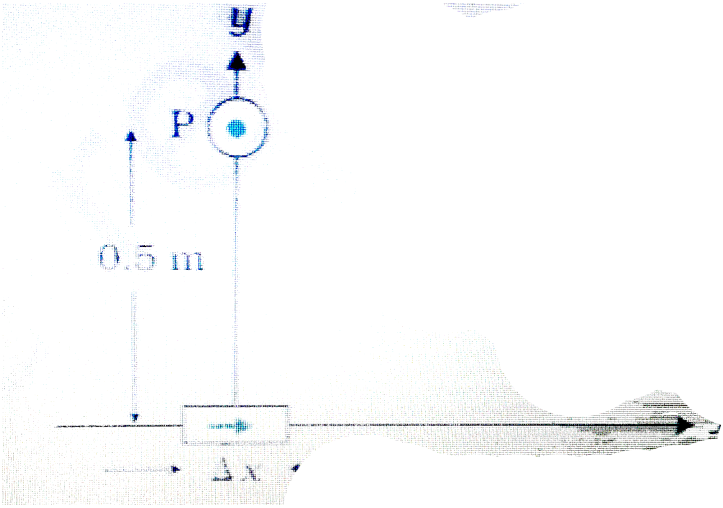
Watch Video Solution

19. Two metal strips, each of length, each of length l, are clamped parallel to each other on a horizontal floor with a separation b between them. A wire of mass m line on them perpendicularly as shown in figure. A vertically upward magnetic field of strenght B exists in the space. The matal strips are smooth but the cofficient of freiction between the wire and the floor is μ. A current i is established when the switch S is closed at the instant $t = 0$. Discuss the motion of the wire after the switch is closed. How far away from the strips will the wire reach?



Watch Video Solution

20. An element $\Delta l = \Delta x \hat{i}$ is placed at the origin and carries a large current $I = 10A$ (Fig.) . What is the magnetic field on the y-axis at a distance of $0.5m$. $\Delta x = 1cm$.

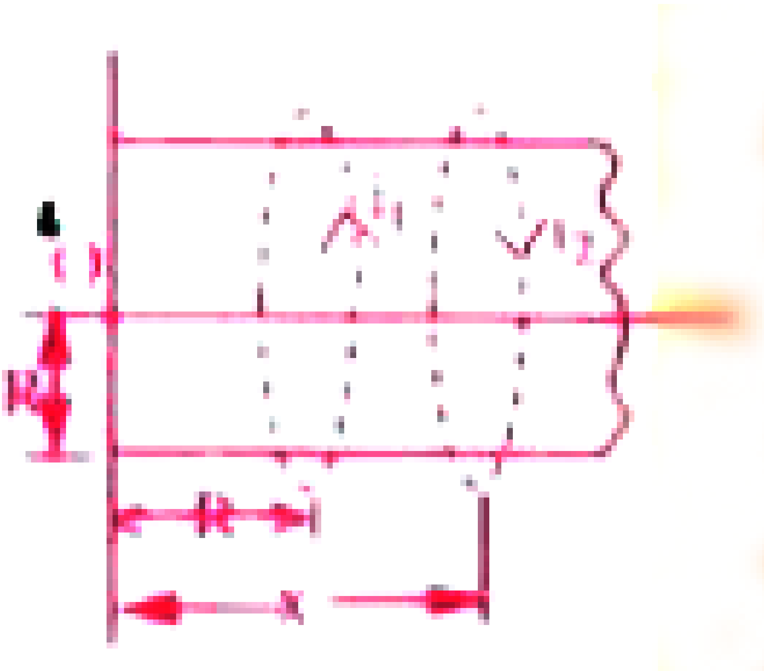


Watch Video Solution

21. Three rings, each having radius R, are placed mutually perpendicular to each other and each having its centre at the origin of co-ordinate system. If current I is flowing through each ring then the magnitude of the magnetic field at the common centre is:

Watch Video Solution

22. Two wires are wrapped over a wooden cylinder to form two coaxial loops carrying currents i_1 and i_2. If $i_2 = 8i_1$ then find tlte value of x for B = 0 at the origin O



Watch Video Solution

23. A 2A current is flowing through a circular coil of radius 10 cm containing 100 turns. Find the magnetic flux density at the centre of the coil.

Watch Video Solution

24. A current of I amperes is flowing through each of the bent wires as shown. Find the magnitude of magnetic field at O.

Watch Video Solution

25. Two wires wrapped over a conical form the loops 1 and 2. If they produce no net magnetic field at the apex P, find the value of $\frac{i_1}{i_2}$

Watch Video Solution

26. A plastic disc of radius 'R' has a charge 'q ' uniformly distributed over its surface. If the disc is rotated with a frequency 'f' about its axis, then the magnetic induction at the centre of the disc is given by

Watch Video Solution

27. A thin insulated wire form a spiral of N=100 turns carrying a current of i=8mA . The inner and outer radii are equal to a=5cm and b=10cm. Find the magnetic field at the centre of the coil.

Watch Video Solution

28. Two circular coils made of same material having radii 20cm & 30cm have turns 1 00 & 50 respectively. If they are connected

a) in series b) in parallel

c) separately across a source of emf find the ratio of

magnetic inductions at the centres of circles in each case

Watch Video Solution

29. A charge of 1 coulumb is placed is one end of a non-conducting rod of length $0.6m$.The rod is rotated in a vertical plane about a horizontal axis passing through the other end of the rod with an angular velocity $10^4 \pi rad / \sec$.Find the magnetic field at a point on the axis of rotation of a distance of $0.8m$ from the centre of the path is $N\pi \times 10^{-4} T$,then find value of N.

Watch Video Solution

30. Two circular coils are made from a uniform wire the ratio of radii of circular coils are 2.3 & no. of turns is 3:4. If they are connected in parallel across a battery.

A.: Find ratio of magnetic induction at their centres.

B: Find the ratio magnetic moments of 2 coils

Watch Video Solution

31. The magnetic induction due to the electron revolving in the first Bohr orbit of hydrogen atom at the centre of the orbit is B. If the electron is revolving in the second Bohr orbit the magnetic induction at the centre will be

Watch Video Solution

32. Choose the correct option:

Figure shows a square current carrying loop $ABCD$ of side $2m$ and current$i = \frac{1}{2}A$. The magnetic moment $\overrightarrow{M}$ of the loop is

Watch Video Solution

33. Find the magnetic dipole moment of the spiral of total number of turns N, carrying current I having inner and outer radii v and b respectively

Watch Video Solution

34. If two charged particles each of charge q mass m are connected to the ends of a rigid massless rod and is rotated about an axis passing through the centre and $\perp$ to length. Then find the ratio of magnetic moment to angular momentum

Watch Video Solution

35. A thin uniform ring of radius R carrying charge q and mass m rotates about its axis with angular velocity ω. Find the ratio of its magnetic moment and angular momentum.

Watch Video Solution

36. Consider a solid sphere of radius r and mass m which has charge q distributed uniformly over its volume. The sphere is rotated abut a diameter with an angular speed ω. Show that the magnetic moment μ and the angular momentum l of the sphere are related as $\mu = \frac{q}{2m}l$.

Watch Video Solution

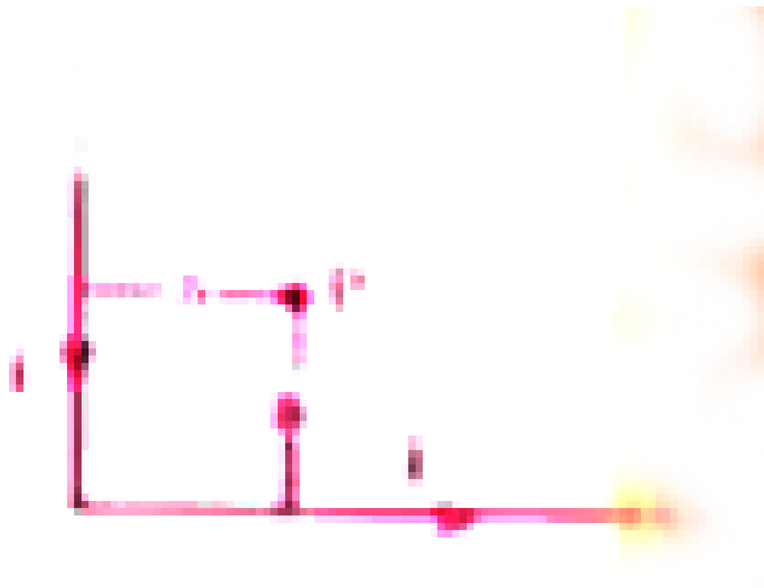
37. Find the magnetic induction due to a straight conductor of length 16cm carrying current of 5A at a distance of 6cm from the midpoint of conductor

Watch Video Solution

38. If a straight conductor of length 40cm bent in the form of a square and the current 2A is allowed to pass through square, then find the magnetic induction at the centre of the square loop

Watch Video Solution

39. A large straight current carrying conductor is bent in the form of Lshape. Find B at P



Watch Video Solution

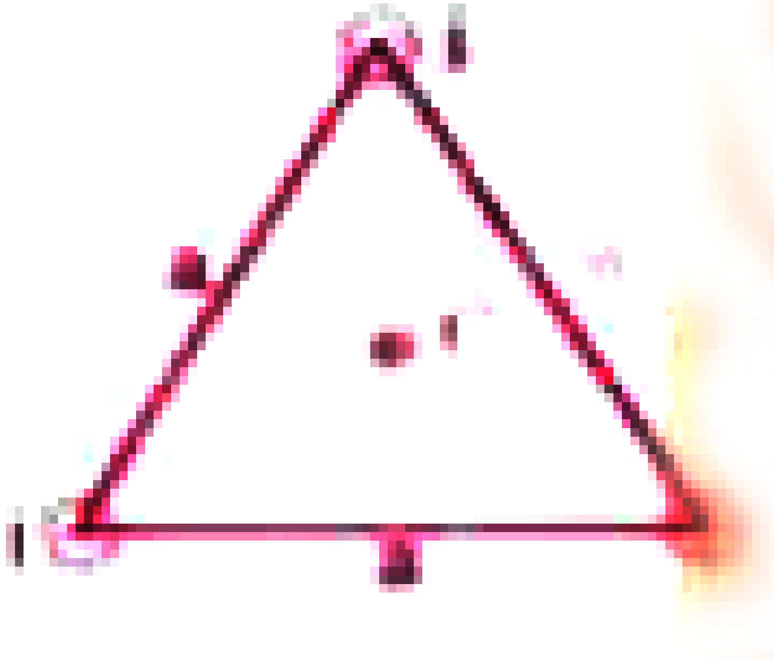
40. If a thin uniform wire of length 1m is bent into an equilateral triangle and carries a current of $\sqrt{3}A$ in anticlockwise direction, find the net magnetic induction at the centroid

Watch Video Solution

41. Two long and parallel straight wires A and B are carrying currents of 4A and 7A in the same directions are separated by a distance of 5cm. The force acting on a 8cm section of wire A is

Watch Video Solution

42. Three parallel long straight conductors are carrying equal currents i each as shown. Th e conductors are passing tlrrough the vertices of equilateral triangle of side 'a'.



Find the magnetic firld at C the centroid of triangle

Watch Video Solution

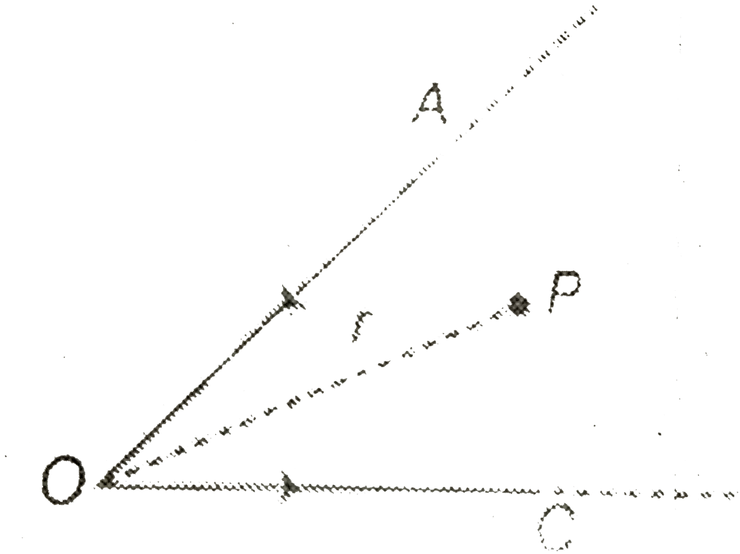
43. Find $\overrightarrow{B}$ at the origin due to the long wire carrying a current I

Watch Video Solution

44. A long straight current carrying conductor has a current from -z to +z, then find the magnetic induction at a point P(x, y, 0) in vectorial notation $\left(\hat{i}, \hat{j}, \hat{k}\right)$ are unit vector along x,y, z axis)

Watch Video Solution

45. Tow wire AO and OC carry euqal current i. as shown in figure . One end of both the wire extends to infinity . Anlge AOC is α . The magnetiude of magnetic fields at a point P on the bisector of these two wirea at a distance r from point O is ltbgt

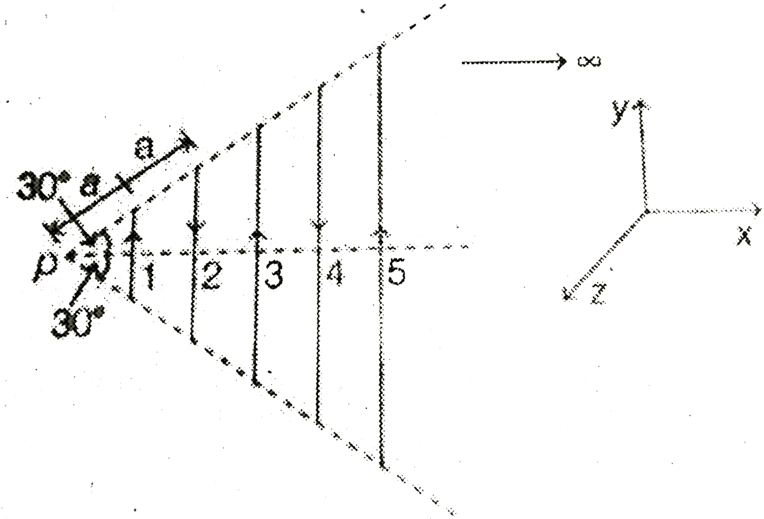


Watch Video Solution

46. Same current i is flowing in three infinitely long wires along positive x,y and z directions. The magnetic field at a point would be

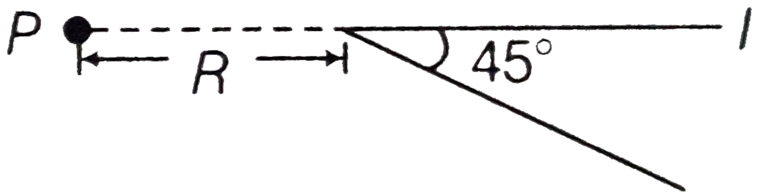
Watch Video Solution

47. Infinte number of straight wires each carrying curret I are equally placed as show in the figure. Adjacent wire have currents in opposite direcation. Net magnetic field at point P is :



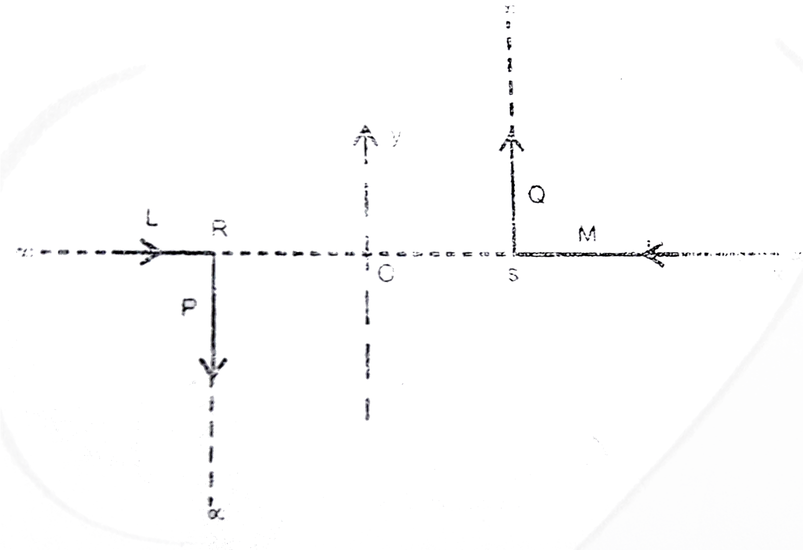
Watch Video Solution

48. A long straight wire, carrying I is bent at its mid-point to form an angle of 45°). Induction of magnetic field (in tesla) at point P, distant R from point of bending is equal to



Watch Video Solution

49. A pair of stationary and infinitely long bent wires is placed in the $X - Y$ plane as shown in figure.The wires carry currents of $10A$ each as shown.The segments L and M are along the x-axis.The segments P and Q are pallel to the Y-axis such that $OS = OR = 0.02m$.Find the magnitude and direction of the magnetic induction at the origin O.

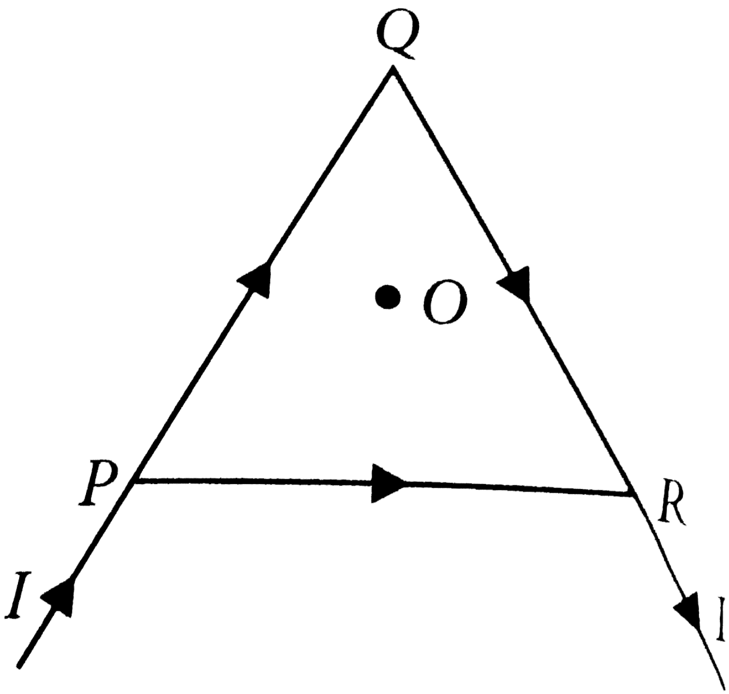


Watch Video Solution

50. Find the magnetic field at P due to the arrangement shown

Watch Video Solution

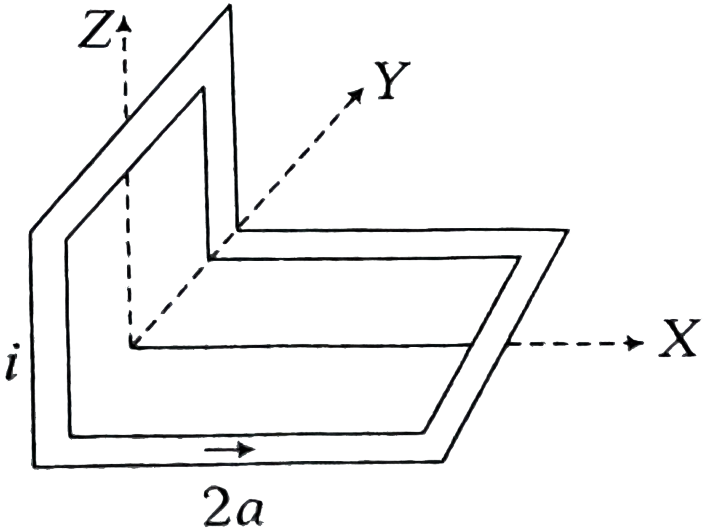
51. An equilateral triangle of side length l is formed from a piece of wire of uniform resistance. The current I is fed as shown in the figure. The magnitude of the magnetic field at its centre O is



Watch Video Solution

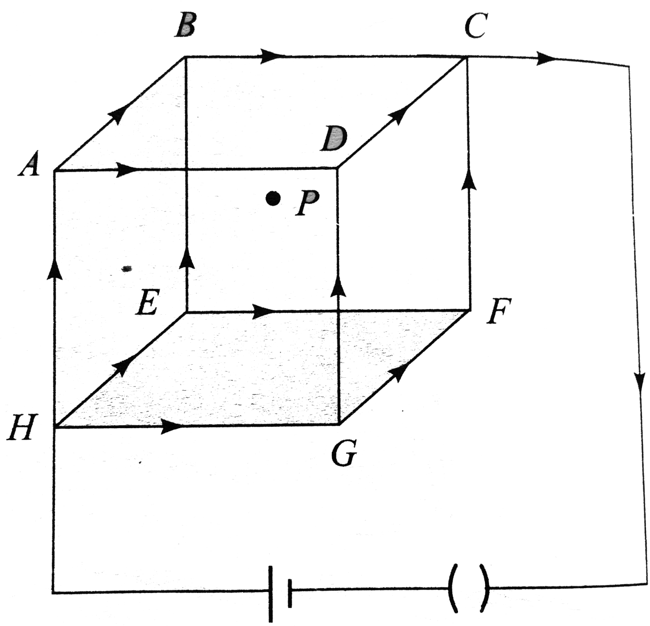
52. A non-planar loop of conducting wire carrying a current I is placed as shown in the figure. Each of the straight sections of the loop is of length 2a. The magnetic field due to this loop at the

point P (a, 0, a) in the direction



Watch Video Solution

53. A steady current is set up in a cubic network composed of wires of equal resistance and length d as shown in Fig. What is the magnetic field at centre P due to the cubic network?

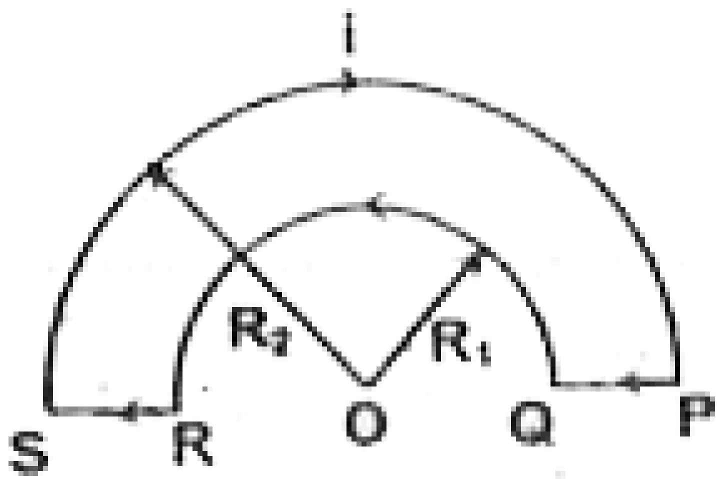


Watch Video Solution

54. A square metallic framee is made of 4 rods of same length 'a ' made of same material but rods, 1 and 2 are of thickness '2d ' & 3, 4 are of thickness d. If they are arranged as shown. Find the net magnetic induction at the point O .

Watch Video Solution

55. The wire loop shown in figure carries a current as shown. The magnetic field at the centre O is ,

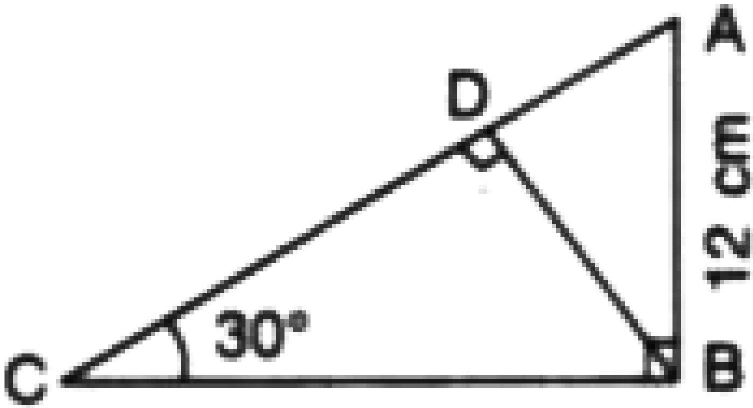


Watch Video Solution

56. Find the magnetic field at centre P due to current i in the conductor as shown in fig.

Watch Video Solution

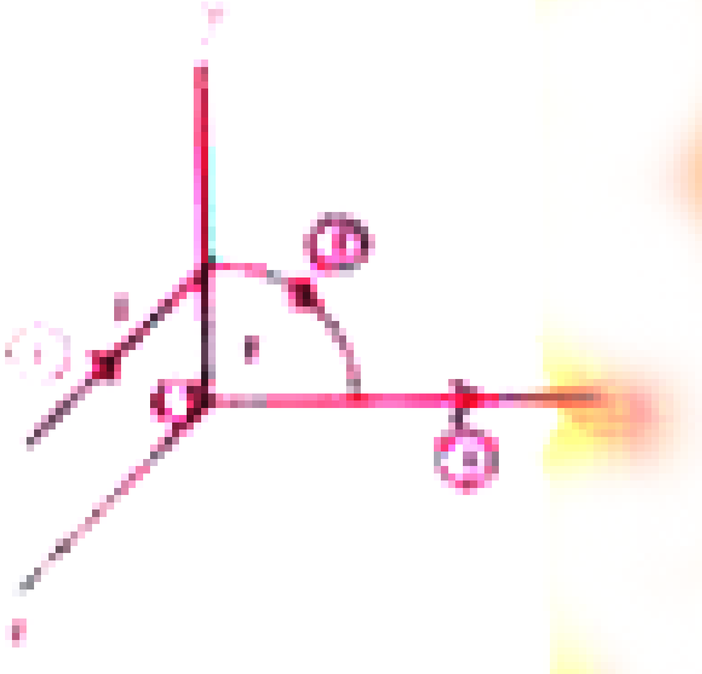
57. Find :



(i) BC

Watch Video Solution

58. Find magnetic field at O due to the current carrying conductor as shown in the figure.



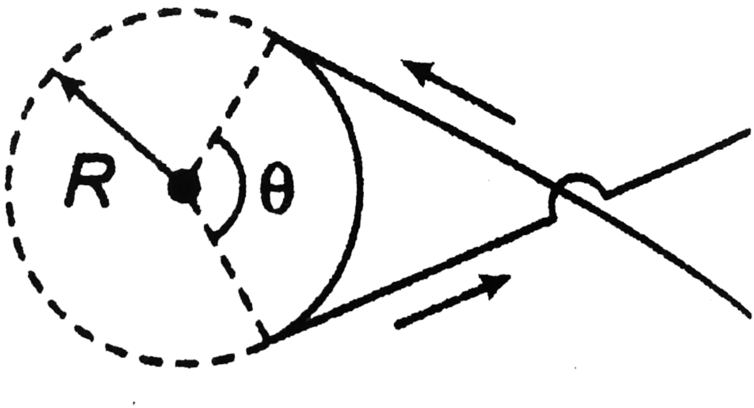
Watch Video Solution

59. A current I flows through an infinitly long wire having infinite brands as shown. The radius of the first curved section is a and the radii of the successive curved portions each increases by a factor η.

Find magnetic field at O.

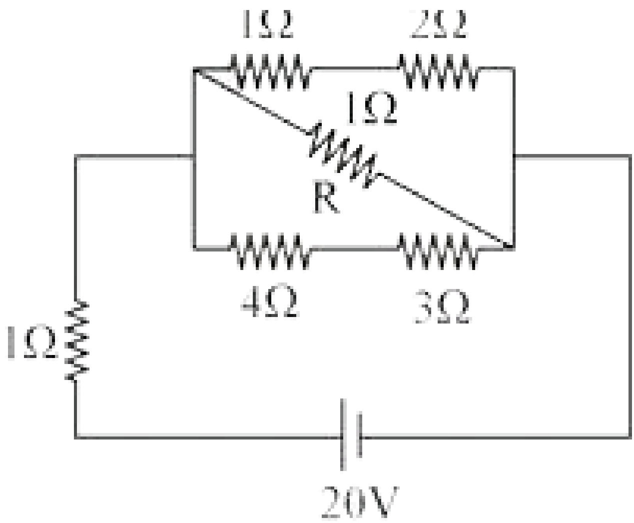
Watch Video Solution

60. A wire carrying current i has the configuration as shown in figure. Two semi-infinite straight sections, both tangent to the same circle, are connected by a circular arc of central angle theta, along the circumference of the circle, with all sections lying in the same plane. What must be for B to be zero at the centre of the circle?



Watch Video Solution

61. Find the current through resistor R.



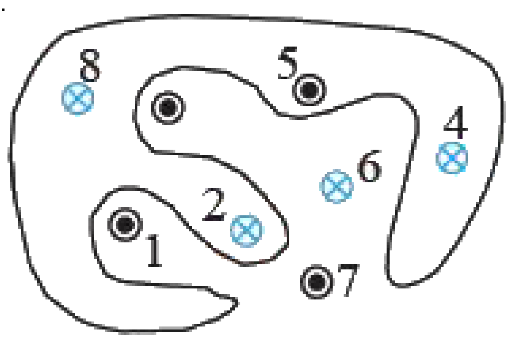
Watch Video Solution

62. Match the following :

(i)	*Colligative property*	**(a)**	*Polysaccharide*
(ii)	*Nicol prism*	**(b)**	*Osmotic pressure*
(iii)	*Activation energy*	**(c)**	*Aldol condensation*
(iv)	*Starch*	**(d)**	*Polarimeter*
(v)	*Acetaldehyde*	**(e)**	*Arrhenius equation*

Watch Video Solution

63. Eight wires cut the page perpendicularly at the points shown. Each wire carries current i. Odd currents are out of the page and even currents into the page. The line integral $\int \vec{B} . \vec{d} l$-along the loop is



Watch Video Solution

64. A solenoid 60 cm long and of radius 4 cm has 3 layer of windings 300 turns each. A 2.3 cm long wire of mass 2.5g lies inside the solenoide near its centre normal to its axis, both the wire and

the axis of the solenoid are in the horizontal plane. The wire is connected through two leads parallel to the axis of the solenoid to an external battery which supplies a current of 6A in the wire. What value of current (with appropriate sense of circulation) in the windings of the solenoid can support the weight of the wire?

Watch Video Solution

65. A solenoid of length 8cm has 500 turns /m in it. If radius of coil is 3cm and if it is carrying a current of 2A, find the magnetic induction at a point 4cm from the end on the axis of the solenoid

Watch Video Solution

66. A solenoid of 2m long & 3cm diameter has 5 layers of winding of 500 turns per metre length in each layer & carries a current of 5A. Find intensity of magnetic field at the centre of the solenoid.

Watch Video Solution

67. A toroid of non ferromagnetic has core of inner radius 25cm and outer radius 26cm. it has 3500 turns & carries a current of 11A, then find the magnetic field at a point

i) In the internal cavity of toroid

ii) At the midpoint of the windings

iii) At a point which is at a distance of 30cm from the centre of toroid

Watch Video Solution

68. An ideal solenoid having 40 turns cm^{-1} has an aluminium core and carries a current of $2.0A$. Calculate the magnetization I developed in the core and the magnetic field B at the centre. The susceptibility χ of aluminium $= 2.3 \times 10^{-5}$.

Watch Video Solution

69. A long, cylindrical iron core of cross-sectional area $5.00 cm^2$ is inserted into a long solenoid having 2000 turns m^{-1} and carrying a current $2.00A$. The magnetic field inside the core is found to be $1.57T$. Neglecting the end effects, find the magnetization I of the core and the pole strength developed.

Watch Video Solution

70. A tightly-wound, long solenoid having 50 turns cm^{-1}, carries a current of $4.00A$. Find the magnetic intensity H and the magnetic field B at the centre of the solenoid. What will be the values of these quantities if an iron core is inserted in the solenoid and the magnetization I in the core is $4.00 \times 10^6 Am^{-1}$?

Watch Video Solution

71. Find the percent increase in the magnetic field B when the space within a current- carrying toroid is filled with aluminium. The susceptibility of aluminium is 2.1×10^{-5}.

Watch Video Solution

72. A toroid has a mean radius R equal to $\frac{20}{\pi}$ cm, and a total of 400 turns of wire carrying a current of $2.0A$. An aluminium ring at temperature $280K$ inside the toroid provides the core. (a) If the magnetization I is $4.8 \times 10^{-2} Am^{-1}$, find the susceptibility of aluminium at $280K$. (b) If the temperature of the aluminium ring is raised to $320K$, what will be the magnetization?

Watch Video Solution

73. A Long straight conductor carrying a current of 2 A is in parallel to another conductor of length 5 cm. and carrying a current 3A. They are separated by a distance of 10 cm. Calculate (a) B due to first conductor at second conductor (b) the force on the short conductor.

Watch Video Solution

74. Two parallel horizontal conductors are suspended by two light vertical threads each 75 cm long. Each conductor has a mass of $40gm$, and when there is no current they are 0.5 cm apart. Equal current in the two wires result in a separation of 1.5 cm. Find the values and directions of currents. Take $g = 9.8ms^{-2}$.

Watch Video Solution

75. Two conductors each of length 12 m lie parallel to each other in air. The centre to center distance between two conductors is 15×10^{-2} m and the current in each conductor is 300 amperes. Determine the force in newton tending to pull the conductors together.

Watch Video Solution

76. Two parallel wires PQ, RS of resistance 10Ω and 20Ω are seperated by a distance of 10 cm and connected in parallel across a cell of emf200V and negligible intemal resistance. A wire AB of mass I g and length 1 cm is balanced exactly, between them. What must be the current in it.

Watch Video Solution

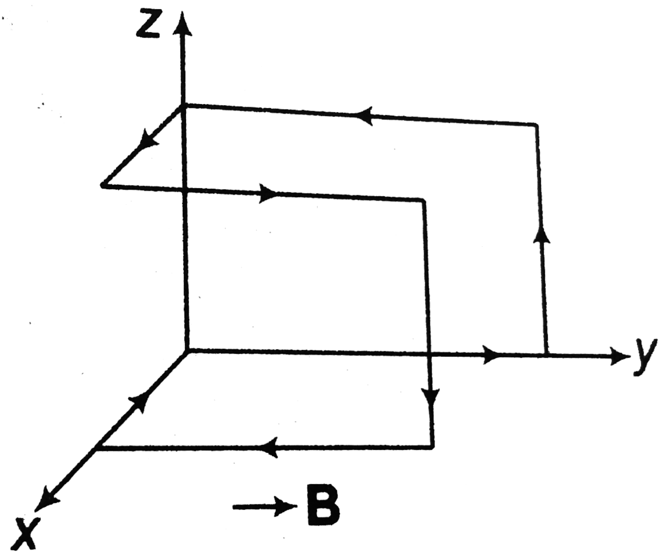
77. A conductor AB of length 10 cm at a distance of 10 cm from an infinitely long parallel conductor carrying a current 10A. What work must be done to move AB to a distance of 20cm if it carries 5A?

Watch Video Solution

78. A circular loop of area $1cm^2$, carrying a current of 10 A , is placed in a magnetic field of 0.1 T perpendicular to the plane of the loop. The torque on the loop due to the magnetic field is

Watch Video Solution

79. Given figure shows a coil bent with all edges of length $1m$ and carrying a current of $1A$. There exists in space a uniform magnetic field of $2T$ in positive y-direction. Find the torque on the loop.

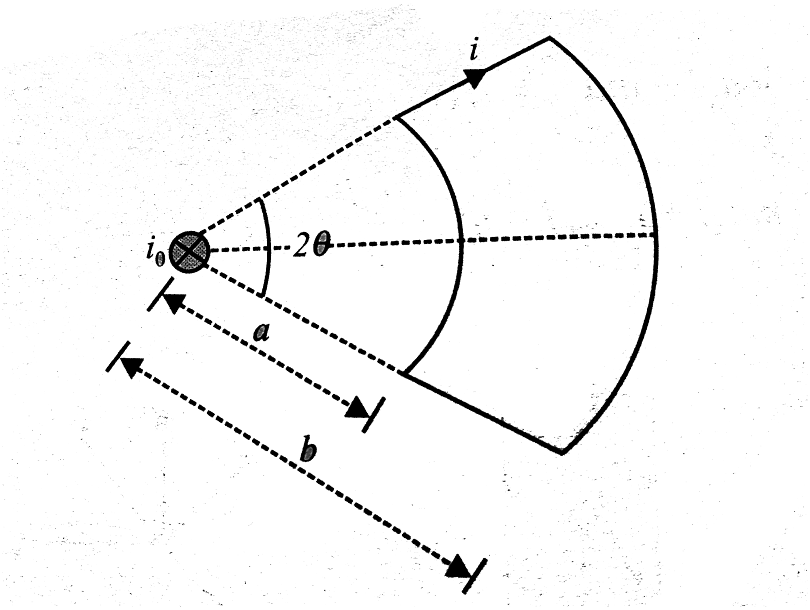


Watch Video Solution

80. A mentallic wire is folded to from a square loop of a . It crries a cureent i and is kept perpendicular to unifrom magnetic field . If the shape of the loop changed from squre to a circle without changing length of the wire and current, the amount of wire done in doing so is

Watch Video Solution

81. A loop, carring a current i, lying in the plane of the paper, is in the field of a long straight wire with current i_0 (inward) as shown in Fig. Find the torque acting on the loop.



Watch Video Solution

82. A ring of mass m and radius r rotates about an axis passing through its centre and perpendicular to its plane with angular velocity ω. Its kinetic energy is

Watch Video Solution

83. The area of the coil in a moving coil galvanometer is 16 cm^2 and has 20 turns. The magnetic induction is 0.2T and the couple per unit twist of the suspended wire is 10^{-6} Nm per degree. If the deflection is 45° calculate the current passing through it.

Watch Video Solution

84. A coil area 100 cm^2 having 500 tums carries a current of 1 mA . It is suspended in a uniform magnetic field of induction $10^{-3} Wb/m^2$. Its plane makes an angle of 60° with the lines of induction. Find the torque acting on the coil.

Watch Video Solution

85. A galvanometer of resistance 20Ω is shunted by a 2Ω resistor. What part of the main current flows through the galvanometer ?

Watch Video Solution

86. A galvanometer has resistance 500 ohm. It is shunted so that its sensitivity decreases by 100 times. Find the shunt resistance.

Watch Video Solution

87. The resistance of galvanometer is 999Ω. A shunt of 1Ω is connected to it. If the main current is $10^{-2}A$, what is the current flowing through the galvanometer.

Watch Video Solution

88. A galvanometer has a resistance of 98Ω. If 2% of the main current is to be passed through the meter what should be the value of the shunt?

Watch Video Solution

89. A maximum current of 0.5 mA can be passed through a galvanometer of resistance 20Ω. Calculate the resistance to be connected in series to convert it into a voltmeter of range $(0-5)V$.

Watch Video Solution

90. A galvanometer h aving 30 divisions has current sensitivity of $20\mu A$/division. . It has a resistances of 25Ω

(i) How will you convert it into an ammeter measuring upto 1 ampere.

(ii) How will you convert this ammeter into a voltmeter upto 1 volt.

Watch Video Solution

91. A galvanometer has a resistance of 100Ω. A current of $10^{-3}A$ pass through the galvanometer. How can it be converted into (a) ammeter of range 10 A and (b) voltmeter of range 10v.

Watch Video Solution

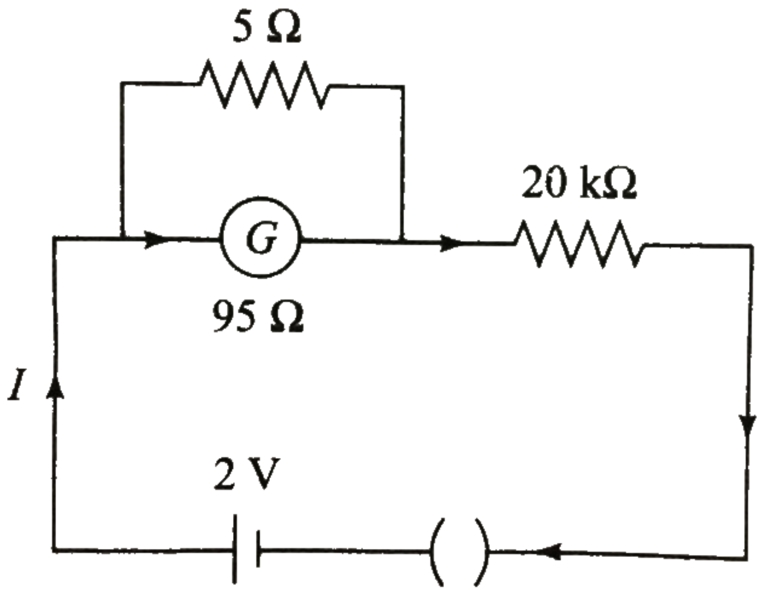
92. What is the value of the shunt that passes 10% of the main current through a galvenomenter of 99Ω?

Watch Video Solution

93. The deflection in a moving coil galvanometer falls from 50 divisions to 10 divisions when a shunt of 12 ohm is applied. What is the resistance of the galvanometer?

Watch Video Solution

94. A galvanometer of resistance 95Ω, shunted resistance of 5Ω, gives a deflection of 50 divisions when joined in series with a resistance of $20k\Omega$ and a $2V$ accumulator. What is the current sensitivity of the galvanomter (in div / μA)?



Watch Video Solution

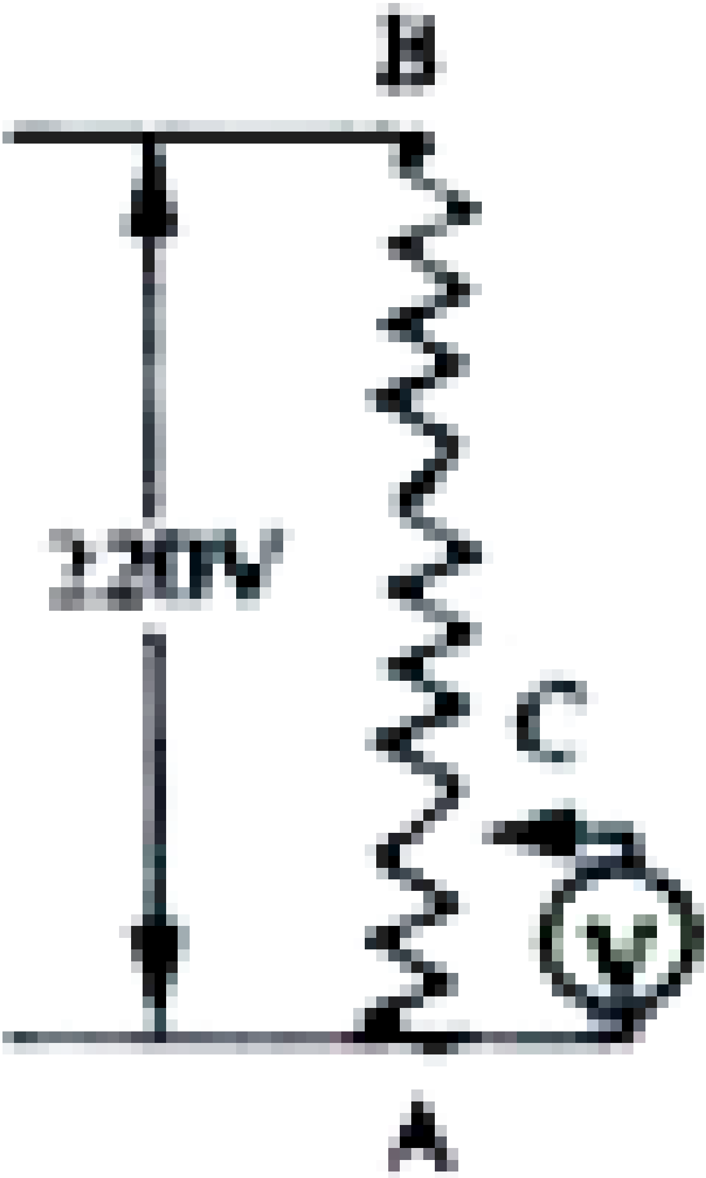
95. Tha scale of a galvanometer is divided into 150 equal divisions.The galvanometer has a current sensitivity of 10 divisions per mA and a voltage sensitivity of 2 divisions per mV . The galvanometer be designed to read (i) 6 A per division and (ii) $1V$ per division?

Watch Video Solution

96. A 100 V voltmeter of internal resistance 20 $k\Omega$ in series with a high resistance R is connected to a 110 V line. The voltmeter reads 5 V, the value of R is

Watch Video Solution

97. A potential difference of 220 V is maintained across a 12000 ohm rheostat AB. The voltmeter V has a resistance of 6000 ohm and point C is at one fourth of the distance from A to B. What is the reading in the voltmeter ?



Watch Video Solution

98. A galvanometer has an internal resistance of 50Ω and current required for full scale deflection is 1 mA. Find the series resistances required [as shown fig] to use it as ameter with different ranges, as indicated in Fig.

Watch Video Solution

99. Two resistances of 100 ohm and 200 ohm are connected in series with a battery of emf 4 volt and negligible internal resistance. A voltmeter of resistance 200 ohm is used to measure voltage across the two resistances separately. Calculate the voltage indicated.

Watch Video Solution

Watch Video Solution

100. A magnetic needle is arranged at the centre of a current carrying coil having 50 turns with radius of coil 20cm arranged along magnetic meridian. When a current of 0.5mA is allowed to pass through the coil the deflection is observed to be 30°. Find the horizontal component of earth's magnetic field

Watch Video Solution

101. A short bar magnet oscillates in VMM with a frequency of 10Hz. If a downward current of 15A is established in a long thin vertical wire placed 20 cm west of the magnet, its frequency was found to be 5Hz. If a TG containing 500 turns with radius of each turn 4π cm is used at that place & a current of 10mA is allowed to pass through it. Find the deflection of magnetic needle in the TG

Watch Video Solution

EXERCISE-IA

1. Statement (A) : Moving charges produce not only an electric field but also magnetic field in space

Statement (B) : The force is exerted by a magnetic field on moving charges or on a current carrying conductor only but not on stationary charges

A. A is a true B is false

B. A is false B is true

C. A and B are true

D. A and B is false

Answer: C

Watch Video Solution

2. An electron travelling horizontally towards west enters into a magnetic field acting vertically down wards. It deflects towards

A. South

B. North

C. Vertically upwards

D. North - East

Answer: B

Watch Video Solution

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

A. $\overrightarrow{v} = \left(\overrightarrow{E} \times \overrightarrow{B}\right) / E^2$

B. $\overrightarrow{v} = \left(\overrightarrow{B} \times \overrightarrow{E}\right) / E^2$

C. $\overrightarrow{v} = \left(\overrightarrow{E} \times \overrightarrow{B}\right) / B^2$

D. $\overrightarrow{v} = \left(\overrightarrow{B} \times \overrightarrow{E}\right) / B^2$

Answer: C

Watch Video Solution

4. 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. $\frac{R_2}{R_2}$

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

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

Answer: C

Watch Video Solution

5. Natural phenomenan known as Aurora Boriolis is due to

A. trapping of charged particles from solar flare in the magnetic field of earth

B. trapping of charged particles from solar flare in the electric field of earth

C. both

D. none

Answer: A

Watch Video Solution

6. A uniform electric field and unifrom magnetic field cting 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 right of direction of motion

B. it will turn towards left of direction of motion

C. its velocity will decrease

D. its velocity will increase

Answer: C

Watch Video Solution

7. If an electron and a proton having same momenta enter a region containing magnetic field perpendicular to magnetic field, then:

A. Curved path of electron and proton will be same (ignoring the sense of revolution)

B. They will move undeflected

C. Curved path of electron is more curved than that of proton

D. Path of proton is more curved

Answer: A

Watch Video Solution

8. An electron enters a region of space in which there exists an electric field 'E' and magnetic field 'B'. If the electron continues to move in the same direction with same velocity as before, the NOT possible case among the following is

A. E = 0 & B=0

B. $E \neq 0 \& B \neq 0$

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

D. $E = 0 \& B \neq 0$

Answer: C

Watch Video Solution

9. An electron moving horizontally from left to right in a region where a magnetic field exists vertically downwards describes: (when seen from above)

A. horizontal clock-wise circular path

B. horizontal anti clock-wise circular path

C. vertical clock-wise circular path

D. vertical anti clock-wise circular path

Answer: A

Watch Video Solution

10. A proton a deuteron and an α - particle having the same kinetic energy are moving in circular trajectories in a constant magnetic of the trajectories of these particle, 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

Watch Video Solution

11. The time period of a charged particle undergoing a circular motion in a uniform magnetic field is independent of its:

A. Speed of the particle

B. Mass of the particle

C. Charge of the particle

D. Magnetic field

Answer: A

Watch Video Solution

12. A beam of the charged particles is passed through a magnetic field. The work done on the beam by the field is

A. zero

B. independent on the speed of the beam

C. dependent on the deflection of the beam

D. dependent on the magnetic induction $\vec{B}$

Answer: A

Watch Video Solution

13. An ionised gas contains both positive and negative ions initially at rest. If it is subjected simultaneously to an electric field along the +x-direction and a magnetic field along the +z-direction, then

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

Watch Video Solution

14. An electron of mass m and charge e is accelerated by a potential difference V. It then enters a uniform magnetic field B applied perpendicular to its path. The radius of the circular path of the electron is

A. $r = \left(\frac{2mV}{eB^2}\right)^{1/2}$

B. $r = \left(\frac{2meV}{B^2}\right)^{1/2}$

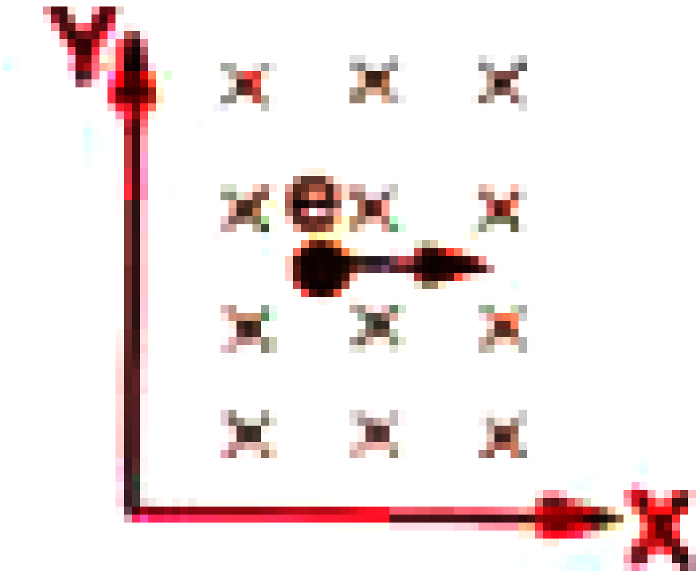
C. $r = \left(\frac{2mB}{eV^2}\right)^{1/2}$

D. $r = \left(\frac{2B^2V}{em}\right)^{1/2}$

Answer: A

Watch Video Solution

15. In the given figure, the electron 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

16. A current canying straight wire is placed along east-west and current is passed through it eastward . The direction of the force act on it due to horizontal component of earth's magnetic field is

A. due west

B. due south

C. vertically upwards

D. vertically downwards

Answer: C

Watch Video Solution

17. Consider a wire carrying a steady current, I placed in a uniform magnetic field B perpendicualr to its length, conside the cahrges inside the wire it is known that magnetic forces do no work. This implies that.

A. motion of charges inside the conductor is unaffected by B since they donot absorb energy

B. some charges inside the wire move to the centre as a result of B

C. if the wire moves under the influence of B, no work is done by the force

D. if the wire moves under the influence of B, no work is done by the magnetic force on the ions, assumed fixed within the wire

Answer: D

Watch Video Solution

18. Two charges particles tranverse identical helical paths in a completely opposite sense in a uniform magnetic field $B = B_0\hat{k}$.

A. They have equal z-components of momenta

B. They must have equal charges

C. They necessarily represent a particle-antiparticle pair

D. The charge to mass ratio satisfy

$$\left(\frac{e}{m}\right)_1 + \left(\frac{e}{m}\right)_2 = 0$$

Answer: D

Watch Video Solution

19. A cubical region of space is filled with some uniform electric and magnetic field. An electron enters the cube across one of its faces with velocity v and a positron enters via opposite face with velocity-v. At this instant, which one of the following is not correct?

A. the electric forces on both the particles cause identical accelerations

B. the magnetic forces on both the particles cause equal accelerations

C. both particles do not gain or loose energy at same rate

D. the motion of the centre of mass (CM) is determined by both B and E.

Answer: B

Watch Video Solution

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

A. an ellipse

B. straight line

C. a circle

D. a heilical

Answer: D

Watch Video Solution

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

A. straight line along the x-direction

B. a circle in the xz plane

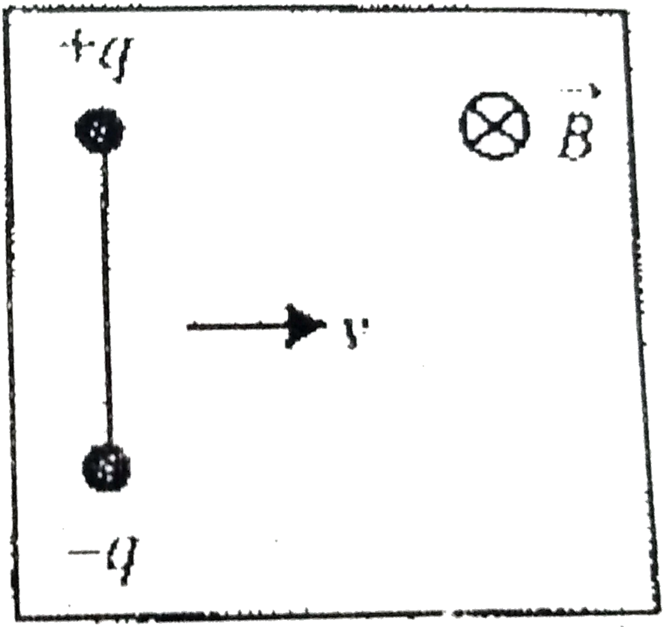
C. a circle in the yz plane

D. a cirlce in the xy plane

Answer: B

Watch Video Solution

22. Two changes +q and -q are attached to the two end of a light rod of length L, as shown in figure . The system is given a velocity v perpendicular to magnetic force on the system of charges and magnitude of force on one charges by the rod , are respectively .



A. zero, zero

B. zero, qvB

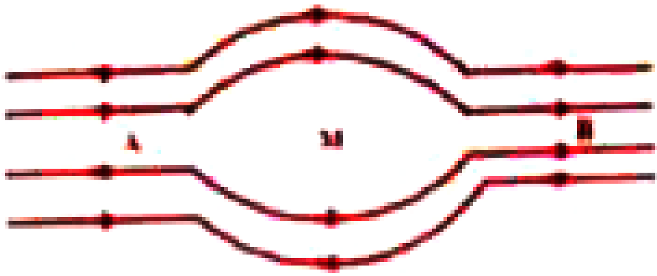
C. 2qvB, 0

D. 2qvB, qvB

Answer: B

Watch Video Solution

23. An uncharged particle is moving with a velocity of $\vec{v}$ in non - uniform magnetic field as shown



Velocity $\vec{v}$ would be

A. Maximum at A & B

B. Minimum at A & B

C. Maximum at M

D. Same at all points

Answer: D

Watch Video Solution

24. When a positively charged particle enters a uniform magnetic field with uniform velocity, its trajectory can be (i) a straight line (ii) a circle (iii) a helix.

A. (i) only

B. (i) or (ii)

C. (i) or (iii)

D. any one of (i), (ii) and (iii)

Answer: D

Watch Video Solution

25. 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

26. 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 possesses circular motion

D. It can go underflected also

Answer: D

Watch Video Solution

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

A. continue 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

Watch Video Solution

28. In a certain region of space electric field $\overrightarrow{E}$ and magnetic field $\overrightarrow{B}$ are perpendicular to each other and an electron enters in region perpendicular to the direction of $\overrightarrow{B}$ and $\overrightarrow{E}$ both and move underflected, then velocity of electron is

A. $\frac{\left|\overrightarrow{E}\right|}{\left|\overrightarrow{B}\right|}$

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

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

D. $\overrightarrow{E} . \overrightarrow{B}$

Answer: A

Watch Video Solution

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

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

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

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

D. $\frac{qB}{4\pi m}$

Answer: B

Watch Video Solution

30. A particle having charge q moves with a velocity v through a region in which both an electric field $\vec{E}$ and a magnetic field B are present. The force on the particle is

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

B. $q\vec{E} \cdot \left(\vec{B} \times \vec{v}\right)$

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

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

Answer: D

Watch Video Solution

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

(1.)acceleration remain unchanged

(2.)velocity remains unchanged

(3.)speed of particles remain unchanged

(4.)direction of particles remain unchanged

A. Velocity remains unchanged

B. Speed of the particle remains unchanged

C. Direction of the particle remains unchanged

D. Acceleration remains unchanged

Answer: B

Watch Video Solution

32. 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 proportionate to

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

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

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

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

Answer: C

Watch Video Solution

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

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

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

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

D. angle between $\vec{v}$ and $\vec{B}$ is necessarily 90°

Answer: B

Watch Video Solution

34. A beam of electrons passes undeflected through uniformly perpendicular electric and magnetic fields. If the electric field is switched off, and the same magnetic field is maintained then the electrons move:

A. in a circular orbit

B. along a parabolic path

C. along a straight line

D. in an elliptical orbit

Answer: A

Watch Video Solution

35. In a mass spectrometer used for measuring the masses of ions, the ions are initially accelerated by an electric potential V and then made to describe semicircular paths of radius R using a magnetic field B. If V and B are kept constant, the ratio $\left(\frac{\text{Charge on the ion}}{\text{mass of the ion}}\right)$ will be proportional to:-

A. $1/R^2$

B. R

C. R

D. $1/R$

Answer: A

Watch Video Solution

36. Under the influence of a uniform magnetic field a charged particle is moving in a circle of radius R with a constant speed v. The time period of a motion

A. depends on both R and v

B. is independent of both R and v

C. depends on Rand not on v

D. depends on v and not on R

Answer: B

Watch Video Solution

37. A particle having a mass of 10^{-2} kg carries a charge of $5 \times 10^{-8} C$. The particle is given an initial horizoantal velocity of $10^5 ms^{-1}$ in the presence of electric field $\vec{E}$ and magnetic field $\vec{B}$. To keep the particle moving in a horizontal direction, it is necessary that -

(a) $\vec{B}$ should be perpendicular to the direction of velocity and $\vec{E}$ should be along the direction of velocity.

(b) Both $\vec{B}$ and $\vec{E}$ should be along the direction of velocity.

(c) Both $\overrightarrow{B}$ and $\overrightarrow{E}$ are mutually perpendicular and perpendicular to the direction of velocity

(d) $\overrightarrow{B}$ should be along the direction of velocity and $\overrightarrow{E}$ should be perpendicualr to the direction of velocity.

Which one of the following pairs of statements is possible ?

A. (2) and (4)

B. (1) and (3)

C. (3) and (4)

D. (2) and (3)

Answer: D

Watch Video Solution

38. A particle moves in a region having a uniform magnetic field and a parallel, uniform electric field. At some instant, the velocity of the particle is perpendicular to the field direction. The path of the particle will be

A. a straight line

B. a circle

C. a helix with uniform pitch

D. a helix with nounifom pitch

Answer: D

Watch Video Solution

39. A uniform electric field and unifrom magnetic field cting 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. will turn towards right of direction of motion

B. speed will decrease

C. speed will increase

D. will turn towards left direction of motion

Answer: B

Watch Video Solution

40. 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 $K = 2m\pi^2 v^2 R^2$

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

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

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

Answer: C

Watch Video Solution

41. 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 acceleration $3a_0$ towards west. Find the elecrtic field and the minimum possible magnetic field in the room.

A. $\frac{ma_0}{e}\text{west}, \frac{2ma_0}{ev_0}\text{down}$

B. $\frac{ma_0}{e}\text{east}, \frac{3ma_0}{ev_0}\text{up}$

C. $\frac{ma_0}{e}\text{east}, \frac{3ma_0}{ev_0}\text{down}$

D. $\frac{ma_0}{e}\text{west}, \frac{2ma_0}{ev_0}\text{up}$

Answer: A

Watch Video Solution

42. A charged particle is released from rest in a region of steady and uniform electric and magnetic fields which are parallel to each other. The particle will move in a-

A. straight line

B. circle

C. helix

D. cycloid.

Answer: A

Watch Video Solution

43. An electron falling freely under gravity entersa region of uniform horizontal magnetic field pointing north to south. The particle will be deflected towards

A. east

B. west

C. north

D. south.

Answer: A

Watch Video Solution

44. A proton a deuteron and an α - particle having the same kinetic energy are moving in circular trajectories in a constant magnetic of the trajectories of these particle, 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

Watch Video Solution

45. A particle is projected in a plane perpendicular to a uniform magnetic field. The area bounded by the path described by the particle is proportional to

A. i only

B. i & ii

C. i,ii & iv

D. ii & iii

Answer: B

Watch Video Solution

46. When a positively charged particle enters a uniform magnetic field with uniform velocity, its trajectory can be (i) a straight line (ii) a circle (iii) a helix.

A. a only

B. a or b

C. a or c

D. any one of a, b and c

Answer: D

Watch Video Solution

47. A charged particle goes undeflected in a region containing electric and magnetic field. It is possible that

A. Only i & ii are true

B. Only ii & iii are true

C. Only iii & iv are true

D. Only i, ii & iii are true

Answer: A

Watch Video Solution

48. A charged particle describes a circle under the influence of the magnetic field. The quantities that remain constant are

i) K. E ii) Velocity

iii) Time period iv) Momentum

A. Only i & iii are true

B. Only i & iv are true

C. Only i,ii&iii are true

D. All are true

Answer: A

Watch Video Solution

49. A charged particle is projected perpendicular to uniform magnetic field. It describes a circle, the quantities which are inversely proportional to specific charge are

i) Radius ii) K. E

iii) Time period iv) Momentum

A. Only i&ii are true

B. Only i,ii&iv are true

C. Only ii & iii are true

D. Only i & iii are true

Answer: D

Watch Video Solution

50. Magnetic induction at a point due to a small element of current carrying conductor is

A. inversely proportional to the square of the distance of the point from the conductor

B. inversely proportional to the distance of the point form the conductor

C. directly proportional to the square of the length of conductor

D. directly proportional to the square of the current

Answer: A

Watch Video Solution

51. Statement A : current is scalar

Statement B : current element is vector

A. A and B are true

B. A and B are false

C. A and B are false

D. Only B is true

Answer: A

Watch Video Solution

52. A circular coil carrying current behaves as a

A. bar magnet

B. horse shoe magnet

C. magnetic shell

D. solenoid

Answer: C

Watch Video Solution

53. The current through a circular coil appears to be flowing in clock-wise direction for an observer. The magnetic induction at the centre of the coil is:

A. perpendicular to the plane of the coil and towards the observer

B. perpendicular to the plane of the coil and away from the observer

C. paralld to plane of the coil

D. inclined at 45° at the plane of coil

Answer: B

Watch Video Solution

54. A long wire carrying a steady current is bent into a circular loop of one turn. The magnetic field at the centre of the loop is B. it is then bent into a circular coil of n turns. The magnetic field at the centre of this coil of n turns will be

A. n B

B. $n^2 B$

C. $2nB$

D. $2n^2 B$

Answer: B

Watch Video Solution

55. A current carrying coil is placed with its plane in the magnetic meridian of the earth. When seen from east the current flowing in it appears clockwise. The magnetic. field at its centre is directed towards

A. North

B. South

C. West

D. East

Answer: C

Watch Video Solution

56. The magnetic dipole moment of current loop is independent of

A. current in the loop

B. number of turns

C. area of the loop

D. magnetic field in which it is situated

Answer: D

Watch Video Solution

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

A. directed normal to plane of the coil

B. directed parallel to plane of the coil

C. Zero

D. radial from centre of the coil

Answer: A

Watch Video Solution

58. A circular coil of radius r having number of turns n and carrying a current A produces magnetic induction at its centre of magnitude B. B can be doubled by

A. keeping the number of turns n and changing the current to A/2

B. changing the number of turns to n / 2 and keeping the current at A

C. simultaneously changing the number of turns and current to 2n and 2A

D. keeping the current at A and changing the number of turns to 2n.

Answer: D

Watch Video Solution

59. Biot-Savart law indicates that the moving electrons $\left(\text{velocity } \vec{v}\right)$ produce a magnetic field $\vec{B}$ such that

A. $B \perp v$

B. $B || v$

C. it obeys inverse cube law

D. it is along the line joining the electron and point of observation

Answer: A

Watch Video Solution

60. An electron is projected with uniform velocity along the axis of a current carrying long solenoid. Which of the following is true?

A. The electron will be accelerated along the axis

B. The electron path will be circular about the axis

C. The electron will experience a force at 45° to the axis and hence execute a helical path

D. The electron will continue to move with uniform velocity along the axis of the solenoid.

Answer: D

Watch Video Solution

61. In a cyclotron, a charged particle

A. undergoes acceleration all the time

B. speeds up between the dees because of the magnetic field

C. speeds up in a dee

D. slows down within a dee and speeds up between dees

Answer: A

Watch Video Solution

62. The gyro-magnetic ratio of an electron in an H-atom, according to Boh model, is

A. independent of which orbit it is in

B. zero

C. positive

D. increases with the quantum number n

Answer: A

Watch Video Solution

63. 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 arbitrary angle to the magnetic field

C. parallel to the magnetic field

D. perpendicular to the magnetic field

Answer: D

Watch Video Solution

64. Energy in a current carrying coils is stored in the form of

(a) electric field (b) magnetic field (c) dieclectric strenght (d) heat

A. Electric field

B. Magnetic field

C. Dielectric strength

D. Heat

Answer: B

Watch Video Solution

65. The magnetic field dB due to a small element at a distance r and carrying current i is

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

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

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

Watch Video Solution

66. A current loop consists of two identical semicircular parts each of radius R, one lying in the x-y plane and the other in x-z plane. If the current in the loop is i, the resultant magnetic field due to two semicircular parts at their common centre is

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

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

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

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

Answer: B

Watch Video Solution

67. Two similar coils of radius R are lying concentrically with their planes at right angles to each other. The current flowing in them are I and 2I, respectively, the resultant magnetic field induction at he centre will be

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

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

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

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

Answer: A

Watch Video Solution

68. An electron moving in a circular orbit of radius r makes n rotations per second. The magnetic field produced at the centre has magnitude:

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

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

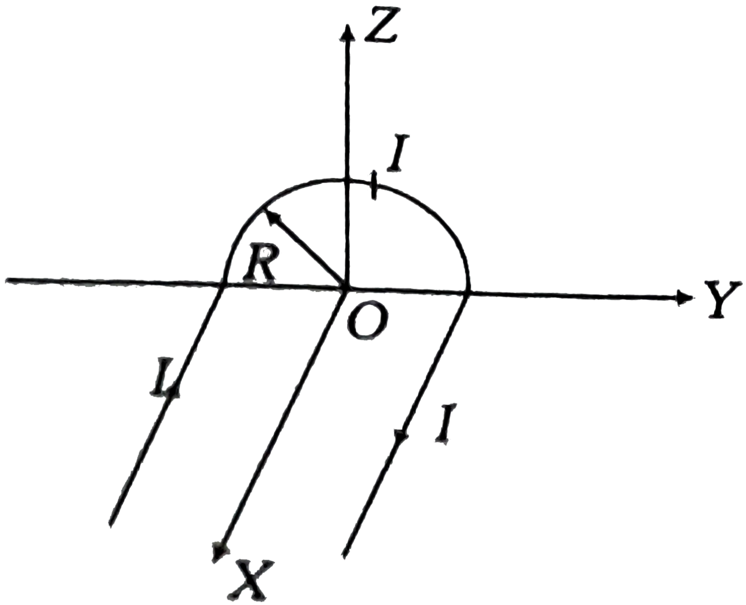
C. $\frac{\mu_0 \neq}{2\pi r}$

D. Zero

Answer: B

Watch Video Solution

69. A wire carrying current I has the shape as shown in adjoining figure. Linear parts of the wire are very long and parallel to X-axis while semicircular portion of radius R is lying in yz-plane. Magnetic field at point O is



A. $\frac{\mu_0 I}{4\pi R}(\pi i + 2k)$

B. $-\frac{\mu_0 I}{2\pi R}(\pi i + 2k)$

C. $-\frac{\mu_0 I}{4\pi R}(\pi + 2k)$

D. $\frac{\mu_0 I}{4\pi R}(\pi - 2k)$

Answer: C

Watch Video Solution

70. A circular loop of radius R, carrying current I, lies in $x-y$ plane with its center at origin. The total magnetic flux through $x-y$ plane is

A. directly proportional to I^2

B. directly proportional to R^2

C. Inversely proportional to R

D. zero

Answer: C

Watch Video Solution

71. A positively charged disk is rotated clockwise as shown in Fig. The direction of hte magnetic field at a point A in the plane of the disk is

A. Into the page

B. Out of the page

C. Up the page

D. Down the page

Answer: B

Watch Video Solution

72. A proton of mass m and charge q enters a magnetic field B with a velocity v at an angle θ with the direction of B.The radius of curvature of the resulting path is

A. $\frac{mv\sin\theta}{qB}$

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

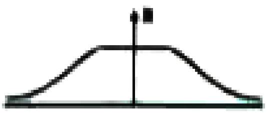
C. $\frac{mv}{qB}$

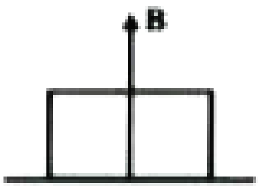
D. $\frac{mv\tan\theta}{qB}$

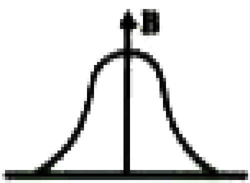
Answer: A

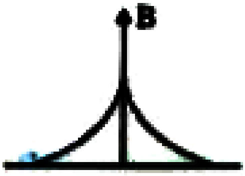
Watch Video Solution

73. 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

Watch Video Solution

74. Which of the following particle will have minimum frequency of revolution when projected with the same velocity perpendicular to a magnetic field?

A. electron

B. proton

C. He^{+}

D. Li^{+}

Answer: D

Watch Video Solution

75. An insulating rod of length l 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. zero

B. $\pi q f l^2$

C. $\frac{1}{2}\pi q f l^2$

D. $\frac{1}{3}\pi q f l^2$

Answer: D

Watch Video Solution

76. Two similar coaxial coils, separated by some distance, carry the same current I but in opposite directions. The magnitude of the magnetic field B at a point on the axis at the mid point of the line joining the centre is :

A. zero

B. the same as that produced by one coil

C. twice that produced by one coil

D. half of that produced by one coil.

Answer: A

Watch Video Solution

77. A magnetic dipole with magnetic moment M is placed at right angles to a magnetic field B. If it is rotated by an angle of 180° , the total work done is

A. $\mu B\theta$

B. $\mu B \cos \theta$

C. $\mu B(1 - \cos \theta)$

D. $\mu B \sin \theta$

Answer: C

Watch Video Solution

78. Arrange the following in asending order of magnetic induction at a point on axis of circular loop of radius (r) at a distance (x) from its centre (for the same currents in the loops)

a) $r = R, x = \sqrt{3}R$ b) $r = 2R, x = \sqrt{5}R$

c) $r = \frac{R}{2}, x = 2\sqrt{2}R$

A. a, c, b

B. a, b, c

C. b, c, a

D. c, a, b

Answer: D

Watch Video Solution

79. The magnetic field in a straight current carrying conductor wire is:

A. The north pole of the needle will deflect towards his left hand

B. The north pole of the needle will deflect towards his right hand

C. The needle will not deflect

D. The needle will oscillate

Answer: B

Watch Video Solution

80. Statement (A) : Ampere's law states that the line integral of $\vec{B} . \vec{d} l$ along a closed path round the current carrying conductor is equal to $\mu_0 i$ (i is the net current through the surface bounded by the closed path)

Statement (B) : Ampere's law can be derived from Biot savart's law

A. A is true B is false

B. A is false B is true

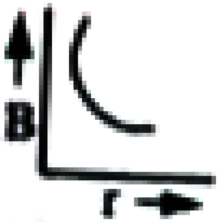
C. A and B are true

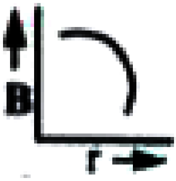
D. A and B is false

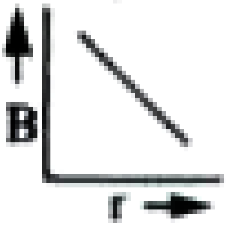
Answer: C

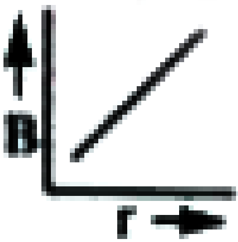
Watch Video Solution

81. Which of the following graphs represent variation of magnetic field B with distance r for a straight long wire carrying current?

A. 

B. 

C. 

D. 

Answer: A

Watch Video Solution

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

A. North to South

B. South to North

C. East to West

D. West to East

Answer: A

Watch Video Solution

83. The strength of magnetic field around an infinitely long current carrying conductor is

A. same every where

B. inversely proportional to distance

C. inversely proportional to square of distance

D. directly proportional to the distance

Answer: B

Watch Video Solution

84. 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 magnetic field of the current.

Answer: A

Watch Video Solution

85. A current I flows along an inflinitely long straight thin walled tube. The magnetic induction at a point inside the tube at a distance r from its wall is

A. infinite

B. zero

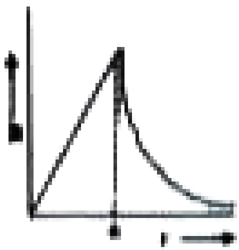
C. $\frac{\mu_0}{4\pi} \cdot \frac{2I}{r}$

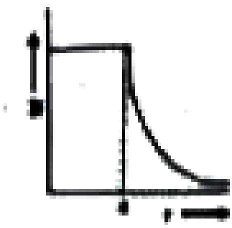
D. $\frac{2I}{r}$

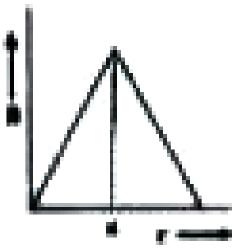
Answer: B

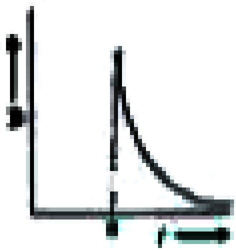
Watch Video Solution

86. The magnetic field due to a straight conductor of uniform cross section of radius a and carrying a steady current is represented by

A. 

B. 

C. 

D. 

Answer: A

Watch Video Solution

87. A current I_1 carrying wire AB is placed near another long wire CD carrying current I_2. If wire AB is free to move, it will have

A. rotational motion only

B. translational motion only

C. rotational as well as translational motion

D. neither rotational nor translational motion

Answer: C

Watch Video Solution

88. Magnetic field at a distance a from long current carrying wire is proportional to

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

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

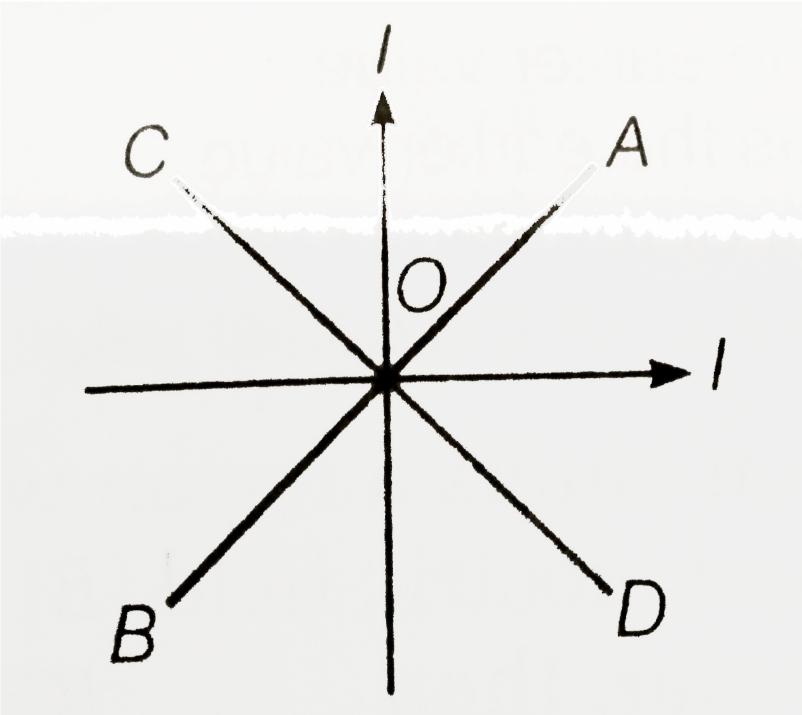
C. $\frac{1}{\sqrt{a}}$

D. $\frac{1}{a^{3/2}}$

Answer: A

Watch Video Solution

89. 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

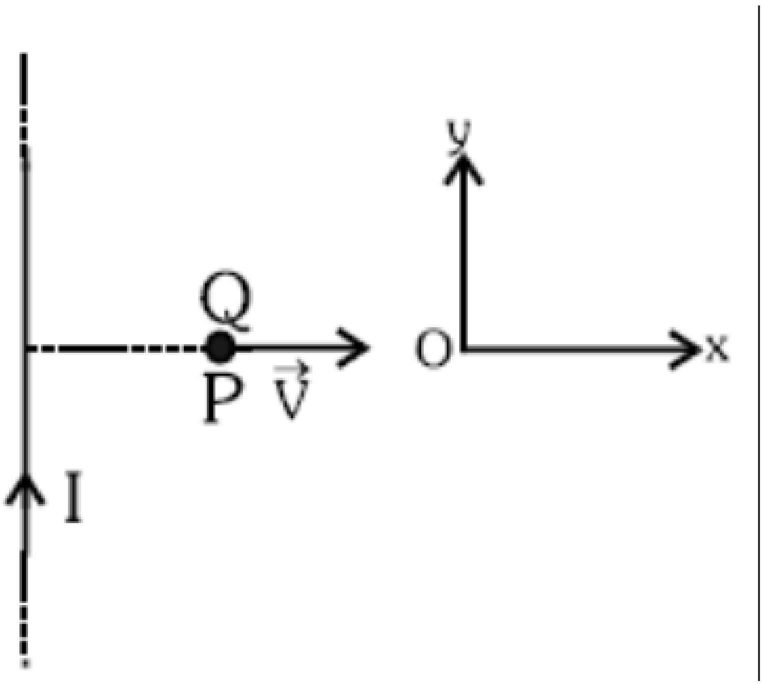
C. on both AB and CD

D. on both OD and BO

Answer: A

Watch Video Solution

90. 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

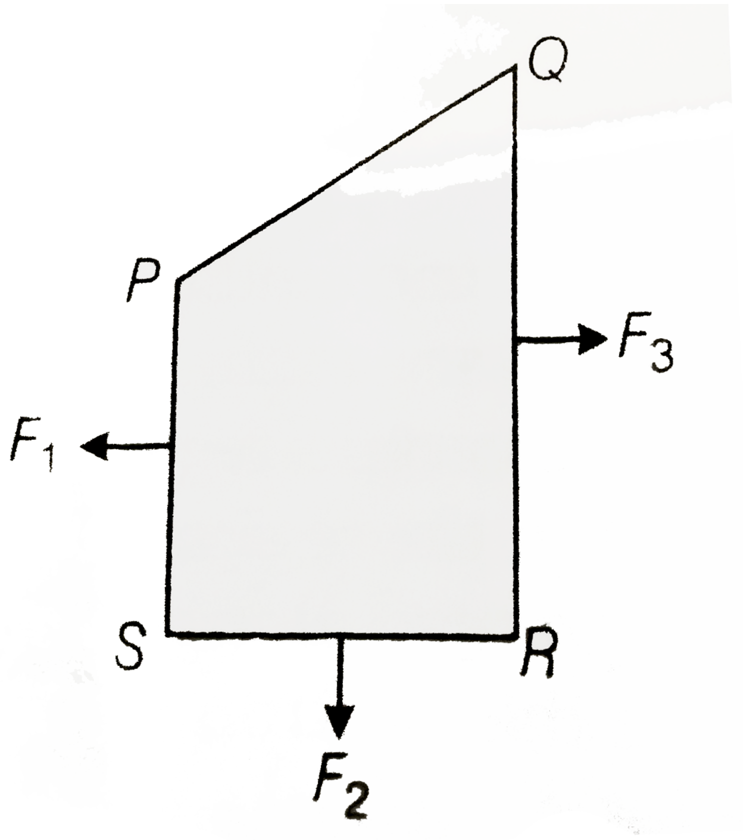
C. along OX

D. opposite to OX

Answer: A

Watch Video Solution

91. A closed loop PQRS carrying a current is placedin auniform magnetic field. If the magnetic force on the segments PS,SR and RQ are $F_1, F_2 \text{and} F_3$ respectively and are in the plane of the p[aper and along the directions shown in the figure, the force on the segment QP is



A. $F_3 - F_1 - F_2$

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

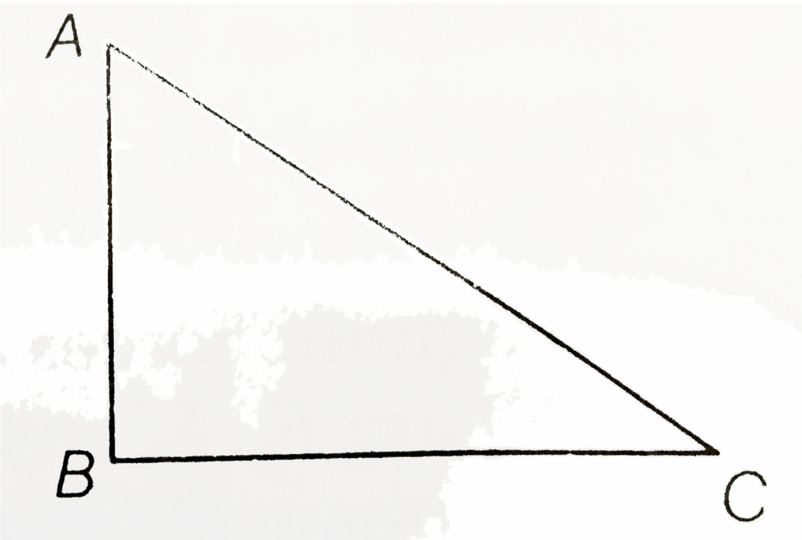
C. $\sqrt{(F_3 - F_1)^2 - F_2^2}$

D. $F_3 - F_1 + F_2$

Answer: B

Watch Video Solution

92. A current carrying closed loop in the form of a right angled isoscels Δ ABC is placed in a uniform magnetic field acting along AB. If the magnetic force on the arm BC is F, the force on the arm AC is



A. $-\sqrt{2}\overrightarrow{F}$

B. $-\overrightarrow{F}$

C. $\overrightarrow{F}$

D. $\sqrt{2}\overrightarrow{F}$

Answer: B

Watch Video Solution

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

A. $\overrightarrow{F}$

B. $-\overrightarrow{F}$

C. $3\overrightarrow{F}$

D. $-3\overrightarrow{F}$

Answer: B

Watch Video Solution

94. Two identical long conducting wires AOB and COD are placed at right angle to each other, with one above other such that O is their common point for the two. The wires carry l_1 and l_2 currents, respectively. Point P is lying at distance d from 0 along a direction perpendicular to the plane containing the wire. The magnetic field at the point P will be

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

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

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

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

Answer: D

Watch Video Solution

95. Two infinitely long thin , insulated,straight wires lie in the x-y plane along the x and y axes, respectively.Each wire carries a current /respectively, in the positive x direction and positive y - direction.The magntic field will be zero at all points on the straight line with equation

A. y=x

B. y=-x

C. y=x-1

D. y=-x+1

Answer: A

Watch Video Solution

96.

List - I	List - II
a) Fleming's left hand rule	e) 'B' due to assymetric current distributions
b) Ampere's law	f) Direction of induced current
c) Biot and Savart's law	g) Direction of the force experienced by a conductor carrying current in a magnetic field
d) Fleming's right hand rule	h) 'B' due to symmetric current distributions

The correct match is

The correct match is

A. a-g , b-f , c-h , d-h

B. a-h , b-g , c-f , d-e

C. a-g , b-h , c-e, d-f

D. a-f , b-h , c-e , d-g

Answer: C

Watch Video Solution

97. A steady electric current is flowing through a cylindrical conductor. Then,

A. Only i, ii are true

B. Only i, ii & iii are true

C. Only ii & iii are true

D. Only ii, iii & iv are true

Answer: C

Watch Video Solution

98. An electron beam produces

i) Electrical field around the beam

ii) Magnetic field around the beam

iii) Electrical field is more stronger than the magnetic field

iv) Electrical and magnetic fields are not produced

A. Only i & ii are true

B. Only ii & iii are true

C. Only i, ii & iii are true

D. Only iii & iv are true

Answer: C

Watch Video Solution

99. A thin straight vertical conductor has 10 amp current, vertically upwards. It is present at a place where $B_H = 4 \times 10^{-6} T$. Arrange the net magnetic inducitons at the following points in ascending order

a) at 0.5m on south of conductor

b) at 0.5m on west of conductor

c) at 0.5m on east of conductor

d) at 0.5m on north-east of conductor

A. a,b,c,d

B. b,a,c,d

C. a,d,c,b

D. b,a,d,c

Answer: D

Watch Video Solution

100. Two straight parallel conductors are kept horizontally one above the other. If the upper wire suspends in air without any support, then the direction of flow of current in the wires should be

A. in same direction

B. in opposite direction

C. in the same or opposite directions

D. the wires should be perpendicular

Answer: B

Watch Video Solution

101. Two wires carrying

A. Parallel current repel each other

B. Antiparallel current attract each other

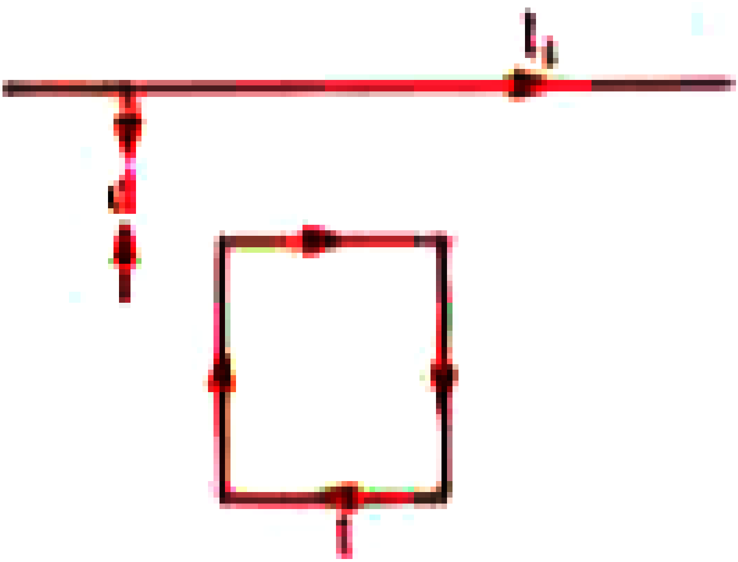
C. Antiparallel current repel each other

D. Equal magnitudes of antiparallel current attract each other.

Answer: C

Watch Video Solution

102. A square loop, carrying a steady current I, is placed in a horizontal plane near a long straight conductor carrying a steady current I_1 at a distance d from the donductor as shown in figure. The loop will experience



A. a net repulsive force 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: D

Watch Video Solution

103. A long, straight wire carries a current along the z-axis. One can find two points in the x-y plane such that

A. Only i & ii are true

B. Only ii & iii are true

C. Only ii, iii & iv are true

D. Only iii & iv are true

Answer: C

Watch Video Solution

104. A loosely wound helix made of stiff metal wire is mounted vertically with the lower end just touching the mercury in a dish. When the current from a battery is started in the metal wire through the mercury. then the spring

A. Executes oscillatory motion

B. Expands

C. contracts

D. none

Answer: A

Watch Video Solution

105. A current carrying loop in a uniform magnetic field will experience torque only neitgher torque nor force

A. force only

B. torque only

C. both torque and force

D. neither force nor torque

Answer: B

Watch Video Solution

106. Two very long, straight, parallel wires carry steady currents I and -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 two wires, in the plane of the wires. Its instantaneous magnitude of the force due to the magnetic field acting on the charge at this instant is :

A. $\frac{\mu_0 I q v}{2\pi d}$

B. $\frac{\mu_0 I q v}{\pi d}$

C. $\frac{2\mu_0 I q v}{\pi d}$

D. zero

Answer: D

Watch Video Solution

107. A rigid circular loop of radius r and mass m lies in the x-y plane on a flat table and has a current i flowing in the it. At this particular place, the earth's magnetic field is $B = B_x\hat{i} + B_z\hat{k}$ .The value of i. so that one edge of the loop lifts from the tables is

A. $\dfrac{mg}{\pi r\sqrt{B_x^2 + B_z^2}}$

B. $\dfrac{mg}{\pi r B_z}$

C. $\dfrac{mg}{\pi r B_x}$

D. $\dfrac{mg}{\pi r\sqrt{B_x B_z}}$

Answer: C

Watch Video Solution

108. A current carrying circular coil, suspended freely in a uniform external magnetic field orients to a position of stable equilibrium. In this state :

A. The plane of coil is normal to external magnetic field

B. The plane of coil is parallel to external magnetic field

C. Flux through coil is minimum

D. Torque on coil is maximum

Answer: A

Watch Video Solution

109. A current loop in a magnetic field

A. can be in equilibrium in one orientation

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

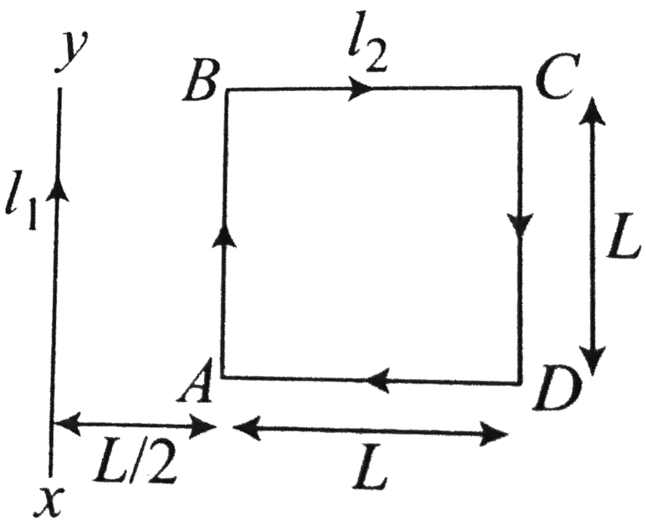
C. can be in equilibrium in two orientations, one stable while the other is unstable

D. experiences a torque whether the field is uniform or non-uniform in all orientations

Answer: C

Watch Video Solution

110. A square loop $ABCD$, carrying a current I_2 is placed near and coplanar with a long straight conductor XY, carrying a current I_1 as shwon in Figure. The net force on the loop will be



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

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

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

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

Answer: A

Watch Video Solution

111. In the above question, the acceleration of the rim will be?

A. $2\pi rIB$

B. $\pi r^2 IB$

C. $2\pi r^2 IB$

D. zero

Answer: D

Watch Video Solution

112. A circular coil of n turns and area of crosssection A , carrying a current i, rests with its plane normal to an external magnetic field B. The coil is free to turn about an axis in its plane perpendicular to the field direction. If the moment of inertia of the coil about its axis of rotation is I, its frequency of oscillation about its stable equilibrium is given by

A. $f=\frac{1}{2\pi}\left(\frac{niAB}{I}\right)^{1/2}$

B. $f=\frac{1}{2\pi}\left(\frac{niA}{BI}\right)^{1/2}$

C. $f=\frac{1}{2\pi}\left(\frac{iAB}{nI}\right)^{1/2}$

D. $f=\frac{1}{2\pi}\left(\frac{nIAB}{i}\right)^{1/2}$

Answer: A

Watch Video Solution

113. A moving coil type of galvanometer is based upon the principle that a current carrying loop in a magnetic field experiences a net

A. torque

B. force

C. impulse

D. all the above

Answer: A

Watch Video Solution

114. The relation between voltage sensitivity (σ_y) and current sensitivity $(\sigma_i)$of a moving coil galvanometer is:

A. $S_v = GS_i$

B. $S_i = GS_v$

C. $S_V S_i = G$

D. $S_V S_i G = 1$

Answer: B

Watch Video Solution

115. The best method to increase the sensitivity of a moving coil galvanometer is to increase the

A. radius of the coil

B. number of turns of the coil

C. strength of radial magnetic field

D. increasing the elasticity of suspension fibre

Answer: C

Watch Video Solution

116. A conducting wire of given length is used to prepare the 'coil' of a moving coil galvanometer. To have maximum sensitivity the shape of the coil should be :

A. circular

B. elliptical

C. rectangular

D. square

Answer: A

Watch Video Solution

117. In a moving coil galvanometer a radial magnetic field is obtained with concave magnetic poles, to have

A. uniform magnetic field

B. the plane of coil is parallel to the field in any orientation of coil

C. a non-linear scale for galvanometer

D. both 1 and 2

Answer: B

Watch Video Solution

118. When a current is passed in moving coil galvanometer, the coil gets deflected because,

A. current in the coil produces an electric field

B. a couple acts on coil

C. the current deflects any thing

D. current in the coil produces magnetic field

Answer: B

Watch Video Solution

119. The current that must flow through the coil of a galvanometre so as to produce a deflection of one division on its scale is called

A. meter sensitivily

B. micro sensitivity

C. micro sensitivity

D. voltage sensitivity

Answer: C

Watch Video Solution

120. To double the torque acting on a coil of n-turns, when placed in a magnetic field

A. area of the coil and the magnetic induction should be doubled

B. area and current through the coil should be doubled

C. only area of coil should be doubled

D. number of turns are to be halved

Answer: C

Watch Video Solution

121. A tangent galvanometer shows no deflection when a current is passed through it. But when the current is reversed, it gives a delfection of 180°, then the plane of the coil should have been oriented:.

A. in the magnetic meridian

B. normal to magnetic meridian

C. at 45° to the magnetic meridian

D. at angle 60° the magnetic meridian

Answer: B

Watch Video Solution

122. A) Tangent galvanometer is a moving magnet type galvanometer

B) Tangent galvanometer works on tangent law

A. A is true, B is false

B. A is false, B is true

C. A & B are true

D. A & B are false

Answer: C

Watch Video Solution

123. The coil of a tangent galvanométer is put in the magnetic meridian.

A. avoid the influence of earth's magnetic field

B. increase the magnetic field due to current in the coil

C. make earth's magnetic field perpendicular to that due to current in the coil

D. make readings more accurate

Answer: C

Watch Video Solution

124. The plane of the coil of tangent galvanometer is kept parallel to magnetic meridian to

A. A is true, B is false

B. A is false, B is true

C. A & B are true

D. A & B are false

Answer: C

Watch Video Solution

125. The magnetic needle of a tangent galvanometer is defiected at an angle deg60 due to a magnet. The horizontal component of earth's magnetic field 0.34 10T is along the plane of the coll The magnetic field of coil is

A. A is true, B is false

B. A is false, B is true

C. A & B are true

D. A & B are false

Answer: C

Watch Video Solution

126. If 'r' is the radius and 'n' is number of turns of coil of a T.G, then to double its sensitivity

A. both r and n should be doubled

B. both r and n should be halved

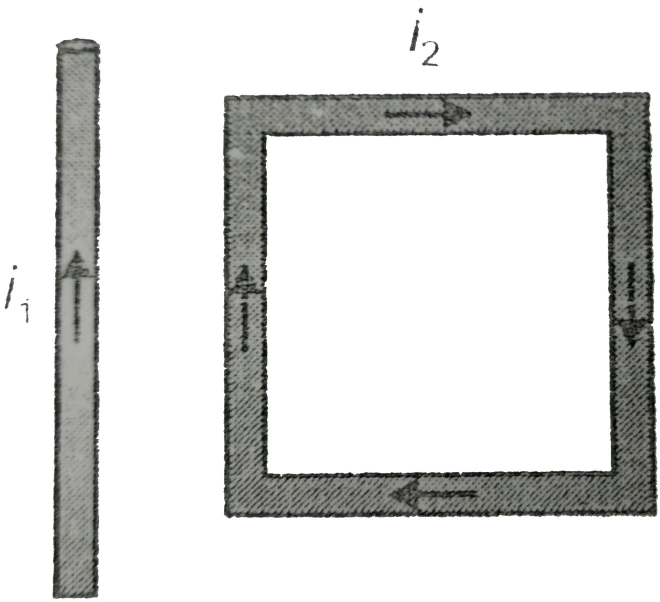
C. r alone should be doubled

D. 'n' alone should be doubled

Answer: D

Watch Video Solution

127. A rectangular loop carrying a current i_2 situated near a long straight wire carrying a steady current i_1. The wire is parallel to one of the sides of the loop and is in the plane of the loop as shown in the figure. Then the current loop will



A. move away from the wire

B. move towards the wire

C. remain stationary

D. rotate about an axis parallel to the wire.

Answer: B

Watch Video Solution

128. When a current loop is placed in a uniform magnetic field

i) $\overline{F}_R = 0$ and $\overline{\tau} = 0$ ii) $\overline{F}_R = 0$ but $\overline{\tau} \neq 0$

iii) $\overline{F}_R \neq 0$ but $\overline{\tau} = 0$ iv) $\overline{F}_R \neq 0$ and $\overline{\tau} \neq 0$

A. Only i & ii are true

B. Only ii & iii are true

C. Only iii & iv are true

D. Only i & iv are true

Answer: A

Watch Video Solution

129. A flat , rectangular coil, carrying current, is placed beside a long straight conductor carrying current. The two are coplanar. The net force and net torque experienced by the coil are F and τ .

A. $F = 0, \tau = 0$

B. $F \neq 0, \tau = 0$

C. $F \neq 0, \tau \neq 0$

D. $F = 0, \tau \neq 0$

Answer: B

Watch Video Solution

130. A moving coil galvanometer can be converted into a voltmeter by connecting :

A. an ammeter by connecting a high resistance in series with it

B. an ammeter by connecting a high resistance in parallel to it

C. a voltmeter by shunting a low resistance to it

D. a voltmeter by connecting a high resistance in series

Answer: D

Watch Video Solution

131. The correct statement among the following is:

A. Ammeter is connected in series in a circuit because its resistance is generally high

B. Voltmeter is connected in parallel in a circuit because its resistance is generally low

C. Voltmeter is connected in parallel because its resistance is generally high

D. Ammeter is connected in parallel because its resistance is generally low

Answer: C

Watch Video Solution

132. Statement A : The resistance of ideal ammeter is zero

Statement B : The resistance of ideal voltmeter is infinity

Choose the correct option among the following.

A. Only A is correct

B. Only 'B' is correct

C. Both A and B are correct

D. Both A and B are false

Answer: C

Watch Video Solution

133. Statement A: Ammeter is a low resistance galvanometer

Statement B: Voltmeter is a high resistance galvanometer

Read the above statements and chose the correct option given below

A. only A is correct

B. only B is correct

C. A and B are correct

D. A and B are false

Answer: C

Watch Video Solution

134. To increase the range of a voltmeter we need to connect a suitable:

A. high resistance in series

B. high resistance in parallel

C. low resistance in series

D. low resistance in parallel

Answer: A

Watch Video Solution

135. An ammeter and a voltmeter of resistance R are connected in series to an electric cell of negligible internal resistance. Their readings are A and V, respectively. If another resistance R is connected in parallel with the voltmeter, then

A. Both A and V increases

B. Both A and V decreases

C. A decreases but B increases

D. A increase but V decreases

Answer: D

Watch Video Solution

136. Two identical galvanometers are converted into an ammeter and a milliammeter. If the shunt, which has more resistance, the current passing through the coil will be

A. less

B. equal

C. more

D. zero

Answer: C

Watch Video Solution

137. A galvanometer of resistance, G, is shunted by a resistance S ohm. To keep the main current in the circuit unchanged the resistance to be put in series with the galvanometer is

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

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

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

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

Answer: C

Watch Video Solution

138. A galvanometer can be converted into either an ammeter or a voltmeter. Before conversion, which of the following thing about the galvanometer you are required to know.

i) Resistance of the galvanometer

ii) The magnetic field in which the coil is rotating

iii)Current for full scale deflection of galvanometer

iv) Nature of its construction

A. Only i is true

B. Only ii is true

C. Only i & ii are true

D. Only i & iii are true

Answer: D

Watch Video Solution

List - I	List - II
a) Tangent galvanometer	e) Uniform calibration of scale
b) Radial magnetic field	f) High resistance
c) Ammeter	g) Reduction factor
d) Voltmeter	h) Low resistance

The correct match is

139.

The correct match is

A. a-h , b-g , c-f , d-e

B. a-g , b-e , c-h , d-f

C. a-h , b-e , c-f , d-g

D. a-h , b-g , c-e , d-f

Answer: B

Watch Video Solution

List - I	List - II
a) Ideal Voltmeter	d) Zero resistance
b) Ideal Ammeter	e) Zero net force
c) Current carrying coil in a uniform magnetic field	f) Zero conductance

140.

The correct match is

A. a-f, b-e, c-d

B. a-f, b-d, c-e

C. a-e, b-f, c-d

D. a-d, b-f, c-e

Answer: B

Watch Video Solution

List - I	List - II
Moving coil galvanometer	d) $i \propto \tan\theta$
Tangent galvanometer	e) $i \propto \theta$
Duddle's galvanometer	f) $i \propto \theta^2$
	g) $i \propto \sqrt{\theta}$

141.

A. a - e , b - f, c - g

B. a - e, b - d, c - g

C. a - d, b - e, c - f

D. a - e, b - d , c - f

Answer: B

Watch Video Solution

142. Arrang the following in decreasing order of their boiling points.

A. n-butane

B.2-methylbutane

C.n-pentane

D.2, 2-dimthylpropane

A. a,b,c,d

B. a,d,b,c

C. a,d,c,b

D. b,c,a,d

Answer: C

Watch Video Solution

EXERCISE-IB

1. Assertion : Magnetic field interacts with a moving charge and not with a stationary charge.

Reason : A moving charge produce a magnetic field.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

2. (A) : If an electron is not deflected while passing through a certain region of space, then only possibility is that there is no magnetic field in this region

(R) : Force on an electron moving in a magnetic field is inversely proportional to the magnetic field applied.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

3. (A) : Free electrons 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.

(R) : The average velocity of free electron in a conductor is zero in the absence of the electric field in it.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

4. (A) : The ion cannot move with a speed beyond a certain limit in a cyclotron.

(R) : As velocity increases the mass of ion increases.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

5. (A) : The frequency of charge circulating in cyclotron depend upon the speed of the charge.

(R) : The time which charge spends inside a dee of cyclotron is dependent on its velocity and radius of the semicircular path.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

6. (A) : An electron and proton entres a magnetic field with equal velocities, then, the force experienced by proton will be more than electron.

(R) : The charge of proton is 1837 times more than the charge of electron.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

7. (A) : If two beams of protons move parallel to each other in same direction then these beams repel each other.

(R) : Like charges repel while opposite charges attract each other.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

8. Assertion: A charged particle is moving in a circle with constant speed in uniform magnetic field. If we increase the speed of particle to twice, its acceleration will become four times.

Reason: In circular path of radius R with constant speed v, acceleration is given by $\frac{v^2}{R}$

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

9. STATEMENT-1: A charged particle is accelerated by a potential difference of V volts. It then enters perpendicularly to a uniform magnetic field. It rotates in a circle. Its angular momentum about centre is say L. Now if V is doubled, L also becomes two times because

STATEMENT-2: If V is doubled, kinetic energy will become two times and therefore, L also becomes two times.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

10. (A) : A current carrying conductor produces only an electric field.

(R) : Electrons in motion in a current carrying wire give rise to a electric field

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

11. (A) : The electron passing parallel to both magnetic and electric field is always deflected from its path

(R) : If velocity of electrons is equal to ratio of magnetic and electric field in crossed fields applied then electron beam remains undeflected.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

12. (A) : Magnetism is relativistic.

(R) : When we move along with the charge so that there is no motion of charge relative to us we find no magnetic field associated with the charge.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

13. (A) : An electron moving with uniform velocity enters uniform magnetic field perpendicularly and then a uniform electric field in the same direction. Nature of paths followed by electron in both the fields will be same.

(R) : The force applied by magnetic and electric field on electron are in the same direction.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

14. (A) : If an electron is not deflected while passing through a certain region of space, then only possibility is that there is no magnetic field in this region.

(R) : Magnetic force on a charged particle is directly proportional to specific charge of particle.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

15. (A) : A helical spring tends to contract, when a current passes through it

(R) : Two straight parallel metallic wires carrying current in same direction repel each other

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: C

Watch Video Solution

16. (A) : A moving charge is a source of magnetic field.

(R) : A current element is a source of magnetic field .

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

17. A: The trajectory of a charge when it is projected perpendicular to an electric fiedl is a parabola.

R: A moving charge entering parallel to the magnetic field lines moves in a circular path.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

18. (A) : In a cyclotron the time for one revolution of an ion is independent of its speed or radius of its orbit.

(R) : In a cyclotron the sign of the electric field changes alternately in tune with the circular motion of particle.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

19. (A) : The values of $\in$ and μ depend on the medium.

(R) : The electromagnetic force between two charges or magnets depends on the medium in which they are located.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

20. Assertion : Cyclotron does not accelerate electrons.

Reason : Mass of the electrons is very small.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

21. Assertion : A charge, whether stationary or in motion produces a magnetic field around it.

Reason : Moving charge produce only electric field in the surrounding space.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

22. Assertion : Magnetic force is always perpendicualr to the magnetic field.

Reason : Electric force is along the direction of electric field.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

23. Assertion : The energy of a charged particle moving in a uniform magnetic field does not change.

Reason : Work done by the magnetic field on a charge particle is zero.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

24. A: magnetic field lines are continuous and form closed loops.

R: Magnetic monopoles do not exist.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

25. Assertion : Magnetic field is useful in producing parallel beam of charged particle.

Reason : Magnetic field inhibits the motion of charged particle moving across it.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

26. (A) : A linear solenoid carrying current is equivalent to a bar magnet.

(R) : The magnetic field lines of both are same.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

27. A square loop of side a carris a current I. The magnetic field at the centre of the loop is

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

28. A circular loop of radius R, carrying current I, lies in $x-y$ plane with its center at origin. The total magnetic flux through $x-y$ plane is

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

29. (A): Magnetic field lines can be entirely confined within the core of a toroid. But not within a straight solenoid.

(R) : The magnetic field inside the solenoid is uniform.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

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

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

31. (A) : A solenoid tend to contract when a current passes through it.

(R) : The magnetic field inside the solenoid is uniform.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

32. (A) : A loosely wound 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, the helical wire executes oscillatory motion with the lower end jumping out of and into the mercury.

(R) : Like current carrying wires attract each other.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: C

Watch Video Solution

33. Assertion : The magnetic field at the ends of a very long current carrying solenoid is half of that at the centre.

Reason : If the solenoid is sufficiently long. The field within it is uniform.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

34. A loosely wound helix made of stiff metal wire is mounted vertically with the lower end just touching the mercury in a dish.

When the current from a battery is started in the metal wire through the mercury. then the spring

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

35. A magnetic needls is kept in a non-unifrom magnetic field . It experinces

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

36. $Assertion:$ A flexible wire loop of irregular shape carrying current when placed in a uniform external magnetic field acquires a circular shape.

$Reason:$ For a given perimeter circular shape is having the greatest area.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

37. (A) : A current carrying circular loop, free to turn, when placed in an external magnetic field, orients its plane normal to field.

(R) : The potential energy of the system is minimum at stable equilibrium position.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

38. Ampere's circuital law is given by

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

39. Deduce the expression for the magnetic dipole moment of an electron orbiting around the central nucleus.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

40. (A) : The microscopic roots of magnetism can be traced back to intrinsic spin of electrons.

(R) : The spinning electron is equivalent to a magnetic dipole.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

41. (A) : The magnetic field at the centre of a circular coil carrying current could be calculated using Amperes law.

(R) : Biot savart law could be derived from Amperes law.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

42. A long solonoid carrying a current produces a magnetic field 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. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

43. (A) : The magnetic field at the centre of a circular coil carrying current could be calculated using Amperes law.

(R) : Biot savart law could be derived from Amperes law.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

44. Ratio of magnetic dipole moment to the angular momentum for hydrogen like atoms is (e and m are electronic change and mass repectively)

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

45. Assertion: When radius of circular loop carrying current is doubled, its magnetic moment becomes four times.

Reason: Magnetic moment depends on area of the loop.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

46. Assertion : A planar circular loop of area A and carrying current I is equivalent to magnetic dipole of dipole moment M = IA.

Reason : At large distances, magnetic field of circular loop and magnetic dipole is same.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

47. Assertion : A charged particle can be accelerated in a cyclotron by the alternate distribution of the field.

Reason : Energy of charged particle is increased by the field applied.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

48. Magnetic induction at a point due to a small element of current carrying conductor is

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

49. A current I flows along an inflinitely long straight thin walled tube. The magnetic induction at a point inside the tube at a distance r from its wall is

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: C

Watch Video Solution

50. (A) : Ampere's law holds for steady currents in straight conductor which do not vary with time.

(R) : Magnetic field lines always form closed loops.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

51. (A) : A spark occur between the poles of a switch when the switch is opened.

(R) : Current flowing in the conductor produces magnetic field.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

52. STATEMENT-1: In electric circuits, wires carrying currents in opposite directions are often twisted together. because

STATEMENT-2: The magnetic field in the surrounding space of a twisted wire system is not precisely zero because the wires are not in the same location in space.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

53. Assertion : Two parallel conducting wires carrying currents in opposite direction, come close to each other.

Reason : Parallel currents repel and anti parallel currents attract.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

54. (A) : Torque on the coil is always maximum, when coil is suspended in a radial magnetic field.

(R) : Torque depends upon the magnitude of the applied magnetic field.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

55. (A) : In case of M.C.G the torque on the coil is maximum in any position of the coil

(R) : In case of M.C.G the concave shaped magnetic poles render the field to be radial between them so that the plane of the coil is always parallel to the lines of induction even after deflection

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

56. Assertion : Earth's magnetic field does not affect the working of a moving coil galvanometer.

Reason: The earth's magnetic field is quite weak as compared to magnetic field produced in the moving coil galvanometer.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

57. (A) : The coil is wound over the metallic frame in moving coil galvanometer.

(R) : The metallic frame help in making steady deflection without any oscillation.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

58. (A) : The tangent galvanometer can be made more sensitive by increasing the number of turns of its coil.

(R) : For a given P.D current through galvanometer is inversely proportional to the number of turns of coil.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

59. (A) : Working of a moving coil galvanometer is based on heating effect of current.

(R) : On heating, the coil starts to rotate in moving coil galvanometer because fo torque.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

60. (A) : A tangent galvanometer is used for measuring current.

(R) : Tangent galvanometer reads current directly.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: C

Watch Video Solution

61. Assertion: Reduction factor k of a tangent galvanometer helps in reducing deflection of current.

Reason: As reduction factor increases with increase of current.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: C

Watch Video Solution

62. The M.I. of a ring of mass radius R about the axis passing through the centre of gravity and normal to its plane will be :

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

63. (A) : Increasing the current sensitivity of an MCG may not necessarily increase the voltage sensitivity.

(R) : Increasing the number of turns of an MCG, increases the resistance of the coil of MCG.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

64. (A) :· The range of given voltmeter can be both increased and decreased.

(R) : By adjusting the value of resistance in series with galvanometer the range of votlmeter can be adjusted.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

65. (A) : Voltmeter put across a part of the circuit, it reads slightly less than the original voltage.

(R) : Voltmeter is always connected in parallel in circuit across which voltage is to be measured.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: B

Watch Video Solution

66. (A) : The resistance of voltmeter is very small as compared to the resistance of the galvanometer, from which it is obtained.

(R) : The voltmeter is connected in series to the conductor across which potential difference is to be measured.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: D

Watch Video Solution

67. (A) : A galvanometer can be used as an ammeter and Voltmeter.

(R) : A galvanometer cannot be used in electric circuit to detect the direction of electric current.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: C

Watch Video Solution

68. (A) : An ammeter is connected in series in the circuit.

(R) : An ammeter is a high resistance galvanometer.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: C

Watch Video Solution

69. (A) : If a galvanometer is converted into an ammeter and a milliammeter then the shunt resistance of ammeter is lower than that of milliammeter.

(R) : In Ammeter the current through shunt is less than that of galvonameter as compared to the case of milliammeter.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: C

Watch Video Solution

70. Statement I: The higher the range, the greater the resistance of an ammeter.

Statement II: To increases the range of an ammeter, additional shunt is needed to be used across it.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

71. Assertion : Voltmeter is connected in parallel with the circuit

Reason : Resistance of a voltmeter is very large.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. 'A' is true and 'R' is false

D. 'A' is false and 'R' is false

Answer: A

Watch Video Solution

EXERCISE-II

1. A proton enters a magnetic field of flux density 1.5 T with a velocity of $2 \times 10^7 ms^{-1}$ at an angle of 30° with the field. The force on the proton is $\left[e_p = 1.6 \times 10^{-19} C\right]$

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

B. $2.4 \times 10^{-11} N$

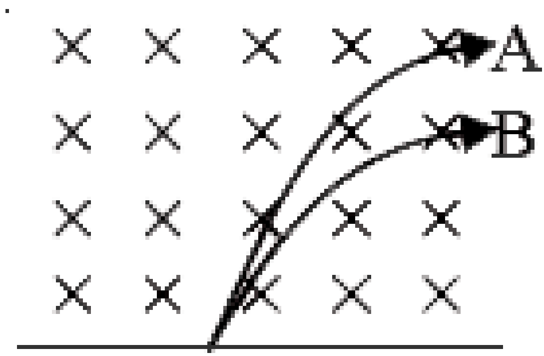
C. $3 \times 10^{-5} N$

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

Answer: B

Watch Video Solution

2. Two particles A and B of masses m_A and m_B respectively and having the same charge are moving in a plane. A uniform magnetic field exists perpendicular to this 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

Watch Video Solution

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

A. 1.18×10^{-13}

B. 1.28×10^{-13}

C. 1.6×10^{-13}

D. 1.72×10^{-13}

Answer: C

Watch Video Solution

4. Two ions having masses in the ratio charges 1:2 are projected into unifrom magnetic field and perpendicular to the field a cyclotron with speeds in the ratio 2:3 ratio of the radii of circularpsth along which the two particle move is

A. $4:3$

B. $2:3$

C. $3:1$

D. $1:2$

Answer: B

Watch Video Solution

5. A proton and an alpha particle both enter a region of uniform magnetic field B, moving at right angles to the field B. If the radius of circular orbits for both the particles is equal and the kinetic energy acquired by proton is 1 MeV, the energy acquired by the alpha particle will be

A. 1MeV

B. 4MeV

C. 0.5MeV

D. 1.5 Me

Answer: A

Watch Video Solution

6. A particle having a charge of $100\mu C$ and a mass of 10mg is projected in a uniform magnetic field of 25m T with a speed of $10 ms^{-1}$. If the velocity is perpendicular to the magnetic field , how long will it take for the particle to come back to its original position for the first time after being projected.

A. 4cm, 25sec

B. 4m, 25 millisec

C. 4cm, 25×10^{-3} sec

D. 4m, 25sec

Answer: C

Watch Video Solution

7. A cyclotron in which the flux density is $1.57T$ is employed to accelerate protons. How rapidly should the electric field between the dees be reversed

A. 4.8×10^{8}

B. 2.5×10^7

C. 4.8×10^6

D. 8.4×10^8

Answer: B

Watch Video Solution

8. A cyclotron adjusted to give proton beam, magnetic induction is $0.15 wbm^{-2}$ and the extreme radius is 1.5m. The energy of emergent proton in Me V will be

A. 3.42

B. 2.43

C. 24.3

D. 34.2

Answer: B

Watch Video Solution

9. A beam of 30 MeV α particles is to be obtained from a cyclotron of radius 50cm . The strength of magnetic field required to be applied will be

A. 1.582 T

B. 0.01582 T

C. 0.1582 T

D. 15.82 T

Answer: A

Watch Video Solution

10. A cyclotron is used to obtain 2 Me V protons. If the frequency is 5MHz and potential is 20kV. The magnetic field necessary for resonance is

A. 2.32T

B. 0.327T

C. 0.528T

D. 0.389T

Answer: B

Watch Video Solution

11. A current of 3 A 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 degree with me direction of the field. It experience of force of magnitude

A. $3 \times 10^{4} N$

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

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

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

Answer: C

Watch Video Solution

12. Magnetic field induction at centre of circular coil of radius 5 cm and carrying a current 0.9 A is (in S.I. units) ($\in_0$ =absolute permittivity of air S.I. units, velocity of light $= 3 \times 10^{8}$m/s)

A. $\dfrac{1}{\in_0 \, 10^{16}}$

B. $\dfrac{10^{16}}{\in_0}$

C. $\dfrac{\in_0}{10^{16}}$

D. $10^{16} \in_0$

Answer: A

Watch Video Solution

13. In an orbit of radius $0.5A^0$ an electron revolves with a frequency of 6.25×10^{15} Hz. The magnetic induction field at its centre is

A. 4π tesla

B. 2π tesla

C. 4 tesla

D. 2 tesla

Answer: A

Watch Video Solution

14. 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. 0.2

B. 0.4

C. 0.6

D. 0.8

Answer: D

Watch Video Solution

15. In an atom the electron has a time period of 0.16×10^{-15}s in a circular orbit of radius 0.5 A^{0}. The magnetic induction at the centre of the orbit will be (in tesla)

A. 12.56

B. 125.6

C. 1.256

D. 25.12

Answer: A

Watch Video Solution

16. A wire carrying 100A is bent into a circular loop of 5cm radius. The flux density at its centre in tesla is

A. 22.56×10^{-4}

B. 23.08×10^{-4}

C. 12.56×10^{-4}

D. 40.06×10^{-4}

Answer: C

Watch Video Solution

17. A circular arc of wire subtends an angle π /2 at the centre. If it carries a current i and its radius of curvature is R then the magnetic field at the centre of the arc is

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

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

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

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

Answer: D

Watch Video Solution

18. A circular coil of wire of radius 'r' has 'n' turns and carries a current 'I'. The magnetic induction (B) at a point on the axis of the coil at a distance $\sqrt{3}r$ from its centre is

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

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

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

D. $\frac{\mu_0 In}{32r}$

Answer: C

Watch Video Solution

19. If B is the magnetic Induction, at the centre of a circular coil of radius 't' carrying a current is 1 T, · then its value at a distance of $\sqrt{3}r$ on the axis from the centre of the coil is

A. $\frac{1}{8}T$

B. $\frac{1}{16}T$

C. $8T$

D. $\frac{1}{16}T$

Answer: A

Watch Video Solution

20. A circular coil 'A' has a radius R and the current flowing through it is i. Another circular coil 'B' has a radius 2R and if 2i is the current flowing through it, then the magnetic fields at the centre of the circular coil are in the ratio of (i.e. $B_A \to B_B$)

A. $4:1$

B. $2:1$

C. $3:1$

D. $1:1$

Answer: D

Watch Video Solution

21. Two circular coils of radii 20 cm and 30cm having number of turns 50 and 100 made of same material are connected in series. The ratio of the magnetic field of induction at their centres is

A. $3:2$

B. $9:4$

C. $3:4$

D. $1:3$

Answer: C

Watch Video Solution

22. 2A current is flowing in a circular coil of 'n' turn, having 10cm radius. The flux density at its centre is $0.126 \times 10^{-2} wb/m^2$. The value of 'n' is

A. 10

B. 100

C. 1000

D. 1

Answer: B

Watch Video Solution

23. Two circular coils are made of two identicle wires of length 20 cm. One coil has number of turns 9 and the other has 3. If the same current flows through the coils then the ratio of magnetic fields of induclion at their centres is

A. $1:9$

B. $9:1$

C. $3:1$

D. $1:3$

Answer: B

Watch Video Solution

24. An electron revolves in a circle of radius 0.4A^0 ith a speed of $10^6 ms^{-1}$ in a hydrogen atom. The magnetic field produced at the centre of the orbit due to motion of the electron, in tesla, is $\left[\mu_0 = 4\pi \times 10^{-7} H/m\right]$

A. 0.1

B. 1

C. 10

D. 100

Answer: C

Watch Video Solution

25. Two concentric coplaner circular loops of radii r_1 and r_2 carry currents of respectively i_1 and i_2 in opposite directions (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 $r_2 = 2r$, the value of i_2 / i_1 is

A. $120\mu_0 T$

B. $480\mu_0 T$

C. $80\mu_0 T$

D. $420\mu_0 T$

Answer: D

Watch Video Solution

26. In a wire of circular form has 4A current is following to have a magnetic induction as $1\mu T$, at its centre. The radius of circle should be approximately

A. 2.5 m

B. 2.5 cm

C. 2.5 mm

D. 25 cm

Answer: A

Watch Video Solution

27. A wire of length L metre carrying a current I ampere is bent in the form of circle. Its magnitude of magnetic moment will be:

A. $\frac{iL}{4\pi}$

B. $\frac{iL^2}{4\pi}$

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

D. $\frac{i^2L^2}{4\pi}$

Answer: B

Watch Video Solution

28. Two identical coils have· a common centre and their planes are at right angles to each other and carry equal currents. If the magnitude of the induction field at the centre due to one of the coil is 'B ', then the resultant magnetic induction field due to combination at their common centre is

A. B

B. $\sqrt{2}B$

C. $B/\sqrt{2}$

D. 2B

Answer: B

Watch Video Solution

29. A wire of length 'I' is bent into a circular loop of radius R and carries a current I. The magnetic field at the centre of the loop is 'B '. The same wire is now bent into a double loop. If both loops carry the same current I and it is in the same direction, the magnetic field at the centre of the double loop will be

A. zero

B. 2B

C. 4B

D. 8B

Answer: C

Watch Video Solution

30. A circular coil is made from a wire of length 2m. Its radius is $\frac{4}{\pi}$ cm. When a current of 1A passes through it, it’s magnetic moment is

A. πAm^2

B. $\frac{4}{100\pi}Am^2$

C. $\frac{16}{\pi}Am^2$

D. $\frac{1}{\pi}Am^2$

Answer: B

Watch Video Solution

31. A horizontal overhead powerline 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

$\left(\nu_0 = 4\pi \times 10^{-7} TmA^{-1}\right.$

A. 2.5×10^{-7} T southward

B. 5×10^{-6} T northward

C. 5×10^{-6} T southward

D. 2.5×10^{-7} T northward

Answer: C

Watch Video Solution

32. The magnituge of 'B' from a conductor carrying 35A at a perpendicular distance of 20cm from it, in tesla is

A. 3.5×10^{-5}

B. 3.5×10^{-3}

C. 0.315×10^{-5}

D. 0.035×10^{-5}

Answer: A

Watch Video Solution

33. A current of 5A flows downwards in a long straight vertical conductor and the earth's horizontal flux density is $2 \times 10^{-7} T$ then the neutral point occurs

A. due north 10 cm from the wire

B. due east 10m from the wire

C. due east 5m from the wire

D. due west 5m from the wire

Answer: C

Watch Video Solution

34. A current of $1/(4\pi)$ ampere is flowing in a long straight conductor. The line integral of magnetic induction around a closed path enclosing the current carrying conductor is

A. 10^{-7} weber per meter

B. $4\pi \times 10^{-7}$ weber per metre

C. $16\pi^{-2} \times 10^{-7}$ webre/metre

D. zero

Answer: A

Watch Video Solution

35. Two long parallel wires placed 0.08 m apart, carry currents 3 A and 5 A in the same direction. what is the distance from the conductor carrying the larger current to the point where the resultant magnetic field is zero?

A. 3cm

B. 5cm

C. 12 cm

D. 20 cm

Answer: B

Watch Video Solution

36. Two long straight parallel conductors 10 cm apart, carry currents of 5A each in the same direction. Then the magnetic induction at a point midway between them is

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

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

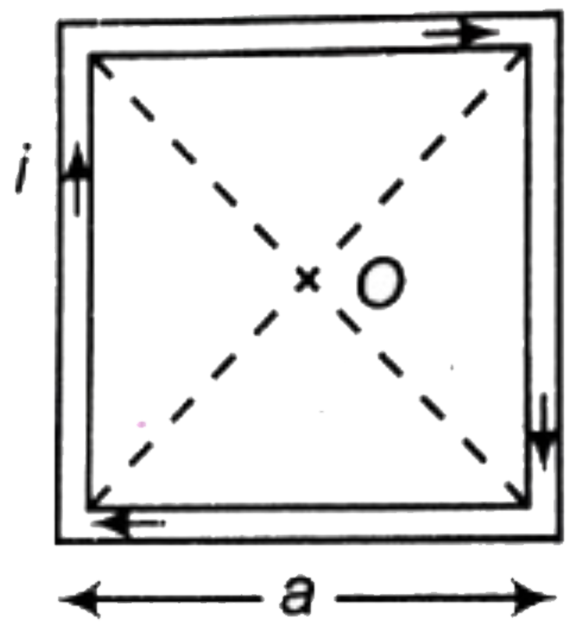
C. $10^{-5} T$

D. zero

Answer: D

Watch Video Solution

37. A wire in the form 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 $= \mu_0$).



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

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

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

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

Answer: C

Watch Video Solution

38. The magnetic induction field at the centroid or an equilateral triangle of side 'I' and carrying a current 'i' is

A. $\frac{2\sqrt{2}\mu_0 i}{\pi l}$

B. $\frac{9\mu_0 i}{2\pi l}$

C. $\frac{4\mu_0 i}{\pi l}$

D. $\frac{3\sqrt{3}\mu_0 i}{\pi l}$

Answer: B

Watch Video Solution

39. A magnetic pole of strength 4 Am is moved twice around a long straight wire carrying a current of 3A. The work done is

A. $96\pi \times 10^{-7} J$

B. $48\pi \times 10^{-7} J$

C. $108\pi \times 10^{-7} J$

D. zero

Answer: A

Watch Video Solution

40. A long straight vertical conductor carries a current of 8A in the upward direction. What the magnitude of the resultant magnetic induction at a point in the horizonatal plane at a distance of 4 cm from the conductor towards South? (The horizontal compo-nent of earth's magnetic induction $= 4 \times 10^{-5} T$)

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

B. $4\sqrt{2} \times 10^{-5} T$

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

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

Answer: B

Watch Video Solution

41. The length of a solenoid is 0.1 m and its diameter is very small. A wire is wound over it in two layers. The numbers of turns in the inner layer is 50 and that on the outer layer is 40 The strength of current flowing in two layers in the same direction is 3A. The magnetic induction in the middle of the solenoid will be

A. $3.4 \times 10^{-3} T$

B. $3.4 \times 10^{-3} T$ gauss

C. $3.4 \times 10^{3} T$

D. $3.4 \times 10^{3} T$ gauss

Answer: A

Watch Video Solution

42. A long solenoid has 200 turns per cm and carries a current i. The magnetic field at its centre is $6.28 \times 10^{-2} weber / cm^2$. Another long soloenoid has 100 turns per cm and it carries a current $\frac{i}{3}$. The value of the magnetic field at its centre is

A. $1.05 \times 10^{-4} Wb / m^2$

B. $1.05 \times 10^{-2} Wb / m^2$

C. $1.05 \times 10^{-5} Wb / m^2$

D. $1.05 \times 10^{-3} Wb / m^2$

Answer: B

Watch Video Solution

43. The magnetic induction at the centre of a solenoid is B. If the length of solenoid is reduced to half and the same wire is wound over it in two layers, then the new magnetic induction will be

A. B

B. 2B

C. B//2

D. 4B

Answer: B

Watch Video Solution

44. A solenoid of 0.4111 length with 500 turns carries a current of 3A. A coil of 10 turns and of radius 0.01m carries a current of 0.4A.

The torque required to hold the coil with its axis at right angles to that of solenoid in the middle point of it is

A. $6\pi^2 \times 10^{-7} Nm$

B. $3\pi^2 \times 10^{-7} Nm$

C. $9\pi^2 \times 10^{-7} Nm$

D. $12\pi^2 \times 10^{-7} Nm$

Answer: A

Watch Video Solution

45. The perpendicular distance between two conductor of 12 m each is 0.15cm. They carry 300A in same direction. The force acti ng between them is

A. 288N repulsion

B. 144N attraction

C. 14N attraction

D. 36N repulsion

Answer: B

Watch Video Solution

46. Across a long conductor 2A current is flowing. At 10 cm from it another 5cm long condutor carries 3A. The value of B at short conductor and force on it, in the multiple of 10^{-6} are

A. 4T, 6N

B. 4T, 0.6 N

C. 6N, 0.4T

D. 6N, 6T

Answer: B

Watch Video Solution

47. Two parallel conductors are separated by 5cm. They carry 6A and 2A in the same direction. Between them the location from first at which magnetic needdle lies along B_H is

A. $1.25cm$

B. 3.75 cm

C. 2.5 cm

D. no point exist

Answer: B

Watch Video Solution

48. A horizontal wire carries 200A current below which another wire of linear density 20×10^{-3} Kg/m carrying a current is kept at 2cm distance. If the wire kept below hangs in air, then the current in the wire is

A. 9.8 A

B. 98 A

C. 980 A

D. 9800 A

Answer: B

Watch Video Solution

49. There long, straingth parallel wires carrying current, are arranged as shown in the figure. The force experienced by a 25 cm length of wire C is

A. $4 \times 10^{-4} N$ from left to right

B. 4×10^{-4} N from right to left

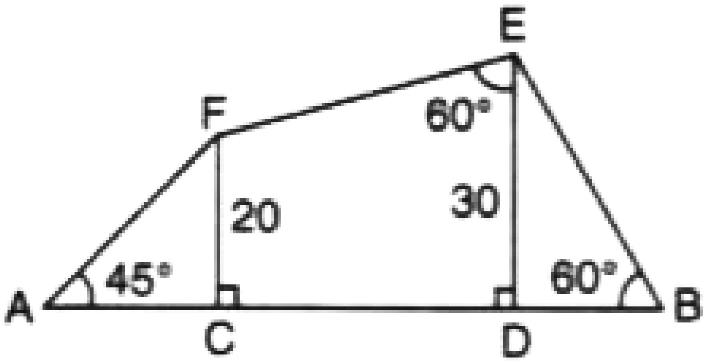
C. 2×10^{-4} N from left to right

D. 2×10^{-4} N from right to left

Answer: A

Watch Video Solution

50. Find AB.



A. 8×10^{-4} N attraction

B. $7.2 \times 10^{-4} N$ attraction

C. $7.2 \times 10^{-4} N$ repulsion

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

Answer: B

Watch Video Solution

51. Two long conductors, separated by a distance d carry currents l_1 and l_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. $\frac{F}{3}$

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

D. $-\frac{F}{3}$

Answer: C

Watch Video Solution

52. A rectangul ar coil of wire of 100 turns and $10 \times 15 cm^2$ size carrying a current of 2Amp. is in a magnetic field of induction $2 \times 10^{-3} wb / m^2$. If the normal drawn to the plane of the coil makes an angle 30° with the field, then the torque on the coil is

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

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

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

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

Answer: B

Watch Video Solution

53. A $16 cm^2$ coil has 20 turns. Its suspended by a phosphor bronze wire of $10^{-6} Nm$ per degree as couple per unit twist. When 'i' ampere is passing through it, in a 0.2T field, the wire twisted by 45°. The value of 'i' is?

A. $7 \times 10^{-3} A$

B. $8 \times 10^{-3} A$

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

D. 4A

Answer: A

Watch Video Solution

54. A rectangular coil of 500 turn $10^{-2} m^2$ area carrying 1 A is in a magnetic field of 1 T at 60° to its plane. The net rotating effect it could experience in (Nm) is

A. 250

B. 25

C. 2.5

D. 0.25

Answer: C

Watch Video Solution

55. A rectangular coil of length 0.12 m and width 0.1.m having 50 turns of wire is suspended vertically in a uniform magnetic field of strength 0.2 Weber/m^2. The coil carries a current of 2A. If the plane of the coil is inclined at an angle of 30° with the direction of the field, the torque required to keep the coil in stable equilibrium will be :

A. 0.12 Nm

B. 0.15 Nm

C. 0.20 Nm

D. 0.24 Nm

Answer: C

Watch Video Solution

56. A coil in the shape of an equilateral triangle of side l is suspended between the pole pieces of a permanent magnet such that $\vec{B}$ is in place 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. $\frac{2}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)$

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

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

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

Answer: B

Watch Video Solution

57. A moving coil galvanometer 'A' has 200 turns and a resistance of 100Ω. Another meter 'B' has 100 turns resistance 400 . All the other quantities are same in both the cases. The current sensitivity of A is

A. double that of B

B. 2.5 times of B

C. 5 times of B

D. $1/5^{th}$ of B

Answer: A

Watch Video Solution

58. two galvanometers of resistance 100Ω and 50Ω, are $10^{-8} A/\text{div}$ and 2×10^{-5} A/div respectively. In which case the voltage sensitivity is more ?

A. more in case I

B. more in case II

C. same in both cases

D. can't say

Answer: A

Watch Video Solution

59. A vertical circular coil of one turn and radius 9.42 cm is placed with its plane in the magnetic meridian and short magnetic needle is pivoted at the centre of the coil so that it can freely rotate in the horizontal plane. If a current of 6A is passed through the coil, then the needle deflects by $\left(B_H = 4 \times 10^{-5} T\right)$

A. 30°

B. 45°

C. 60°

D. 90°

Answer: B

Watch Video Solution

60. A current or 0.5 A produces a deflection of 60º in a tangent galvanometer. The cunent that produces a deflection of 30º in the same galvanometer is

A. $(0.5)2A$

B. $\frac{0.5}{3}A$

C. $\frac{0.5}{\sqrt{2}}A$

D. $\frac{0.5}{\sqrt{3}}A$

Answer: B

Watch Video Solution

61. A tangent galvanometer shows no deflection when a current is passed through it. But when the current is reversed, it gives a delfection of 180°, then the plane of the coil should have been oriented:.

A. in the magnetic meridian

B. normal to the magnetic meridian

C. at an angle of 45° to magnetic meridian

D. at an angle of 60° to the magnetic meridian

Answer: B

Watch Video Solution

62. The senstivity of a galvanometer that measures current is decreased by 1/40 times by using shunt resistance of 10Ω . Then, the value of the resistance of the galvanometer is

A. 400Ω

B. 410Ω

C. 30Ω

D. 390Ω

Answer: D

Watch Video Solution

63. In a galvanometer 5% of the total current in the circuit passes through it. If the resistance of the galvanometer is G, the shunt resistance 'S' connected to the galvanometer is

A. 19

B. G/19

C. 20 G

D. G/20

Answer: B

Watch Video Solution

64. A galvanometer of resistance 150 ohm is shunted such that only 1/11 of the main current flows through the galvanometer. The resistance of the shunt is, (in ohm)

A. 5

B. 10

C. 15

D. 25

Answer: C

Watch Video Solution

65. A galvanometer has coil of resistance 50Ω and shows full deflection at $100\mu A$. The resistance to be added for the galvanometer to work as an ammeter of range 10mA is nearly

A. 0.5Ω in series

B. 0.5Ω in parallel

C. 5.0Ω in series

D. 5.0Ω in parallel

Answer: B

Watch Video Solution

66. A galvanometer has a current range of 15mA and voltage range of 750mv. To convert this galvanometer into an ammeter of range 25A, the sunt resistance required is nearly

A. 0.2Ω

B. 0.02Ω

C. 0.03Ω

D. 0.5Ω

Answer: C

Watch Video Solution

67. To convert a 800 mV range milli-voltmeter of resistance 40.Q into a milli ammeter of 100 mA range, the resistance to be connected as shunt is,

A. 10Ω

B. 5Ω

C. 2.5Ω

D. 1Ω

Answer: A

Watch Video Solution

68. In a galvanometer, a current of $1\mu A$ produces a deflection of 20 divisions. It has a resistance of 10Ω. If the galvanometer has 50 vivisions on its scale and a shunt of 2.5Ω. Is connected across the galvanometer, the maximum current that the Galvanometer can measure now is

A. $12.5\mu A$

B. $12.5mA$

C. $12.5 \times 10^{-7}A$

D. $2.5 \times 10^{-3}mA$

Answer: A

Watch Video Solution

69. A galvanometer of resistance 40Ω and current passing through it is $100\mu A$ per divison. The full scale has 50 divisions. If it is converted into an ammeter of range 2A by using a shunt, then the resistance of ammeter is

A. $\frac{40}{399}\Omega$

B. $\frac{4}{399}\Omega$

C. 0.1Ω

D. 0.4Ω

Answer: C

Watch Video Solution

70. An electrical meter of internal resistance 20Ω gives a full scale deflection when one milliampere current flows through it. The maximum current, that can be measured by using three resistors of resistance 12Ω each, in milliamperes is :

A. 10

B. 8

C. 6

D. 4

Answer: C

Watch Video Solution

71. The sensitivity of a galvanometer is 60 divisions/Amp. When a shunt is used, its sensitivity becomes 10 divisions/amp. If galvanometer is of resistance 20Ω, · the value of shunt used is :

A. 4Ω

B. 5Ω

C. 20Ω

D. 2Ω

Answer: A

Watch Video Solution

72. When 500μA curre nt is passed through a galvanometer of 20Ω, it gives a full scale deflection. The external resistance need to be connected to measure 5V is

A. 98Ω parallel

B. 9980Ω parallel

C. 98Ω series

D. 9980Ω series

Answer: D

Watch Video Solution

73. A galvanometer of 25 ohm resistance can read a maximum current of 6mA. It can be used as a voltmeter to measure maximum potential difference of 6V by connecting a resistance to galvanometer. Identify the correct choice from the following

A. 1025Ω in series

B. 1025Ω in parallel

C. 975Ω in series

D. 975Ω in parallel

Answer: C

Watch Video Solution

74. The scale of a galvanometer of resistance 100Ω contains 25 divisions. It gives a deflection of one division on passing a current of 4×10^{-4} A. The resistance (in ohm) to be added to it, so that it may become a voltmeter of range 2.5 V is

A. 120Ω

B. 200Ω

C. 100Ω

D. 50Ω

Answer: B

Watch Video Solution

75. When 0.005A current flows through a moving coil galvanometer, it gives fullscale deflection. It is converted into a voltmeter to read 5 Volt, using an external resistance of 975Ω. The resistance of galvanometer in ohms is

A. 5

B. 10

C. 15

D. 25

Answer: D

Watch Video Solution

76. A voltmeter has a resistance of G ohm and range V volt. The value of resistance used in series to convert it into voltmeter of range nV volt is

A. $(n-1)G$

B. $(n+1)G$

C. $\dfrac{G}{(n-1)}$

D. $\dfrac{G}{(n+1)}$

Answer: A

Watch Video Solution

77. A circuit contains an ammeter, a battery of 30V and a resistanace 40.8Ω all connected in series. If th ammeter has a coil of resistance 480Ω and a shunt of 20Ω, then reading in the ammeter will be

A. $1A$

B. $0.5A$

C. $0.25A$

D. $2A$

Answer: B

Watch Video Solution

78. A 250-turn rectangular coil of length 2.1 cm and width 1.25 cm carries a current of 85μA and subjected to a magnetic field of strength 0.85 T.Work done for ratatiing the coil by 180° against the troque fis

A. $1.15\mu J$

B. $9.1\mu J$

C. $4.55\mu J$

D. $2.3\mu J$

Answer: B

Watch Video Solution

79. To know the resistance G of a galvanometer by half deflection method,a battery of emf V_E and resistance R is used to deflect the galvanometer by angle θ.If a shunt of resistance S in needed get half deflection then G,R and S arc related by the equation

A. $S(R+G)=RG$

B. $2S(R+G)=RG$

C. $2G=S$

D. $2S=G$

Answer: B

Watch Video Solution

EXERCISE-III

1. A proton, a deuteron and an α particle having same momentum enter a uniform magnetic field at right angles to the field. Then the ratio of their angular momenta during their motion in the magnetic field is

A. $2:2:1$

B. $2:1:3$

C. $4:1:2$

D. $4:2:1$

Answer: A

Watch Video Solution

2. 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 gt b is

A. $\frac{qbB}{m}$

B. $\frac{q(b-a)B}{m}$

C. $\frac{qaB}{m}$

D. $\frac{q(b+a)B}{2m}$

Answer: B

Watch Video Solution

3. An electron accelerated through a potential difference V passes through a uniform tranverses magnetic field and experiences a force F. If the accelerating potential is increased to 2V, the electron in the same magnetic field will experience a force:

A. F

B. $F/2$

C. $\sqrt{2}F$

D. $2F$

Answer: C

Watch Video Solution

4. A 2MeV proton is moving perpendicular to a uniform magnetic field of 2.5 Tesla. The force on the proton is

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

B. $8 \times 10^{-11} N$

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

D. $8 \times 10^{-12} N$

Answer: D

Watch Video Solution

5. A charged particle is accelerated thrught a potential difference of 12 kV and acquires a speed of $1.0X10^6 ms^{-1}$. It is then injected perpendiuclarly into a magnetic field of strenght 0.2 T. find the radius of the circle described by it.

A. 2cm

B. 4cm

C. 8cm

D. 12cm

Answer: D

Watch Video Solution

6. A charge partilce with velocity $V = x\hat{i} + y\hat{j}$ moves in a magnetic field $B = y\hat{i} + x\hat{j}$. The magnitude of magnetic force acting on the particle is F. Which one of the following statement(s) is/are correct ?

A. a and b are true

B. a and c are true

C. b and d are true

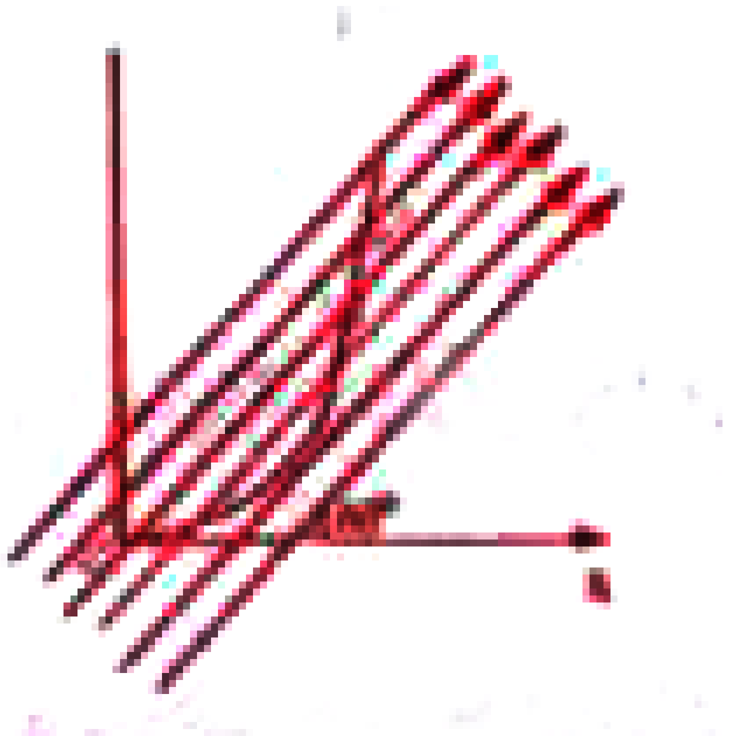
D. c and d are true

Answer: B

Watch Video Solution

7. A parabolic section of wire, as shown in figure is located in the X-Y plane and carries a current of 12A. A uniform magnetic field B =

0.4T making an angle of 60° wihath X-axis exists throughout the plane. The total force acting on a wite between the origin and the point x = 0.25m, y = 1.00 m.



A. $0.68\hat{k}N$

B. $-0.6\hat{k}N$

C. $1.36\hat{k}N$

D. $-1.36\hat{k}N$

Answer: D

Watch Video Solution

8. A semi circular current loop is placed in an uniform magnetic field of 1 tesla as shown. If the radius of loop is 1 m, the magnetic force on the loop is

A. 4N

B. 8N

C. $8/\pi N$

D. zero

Answer: B

Watch Video Solution

9. A straight wire of length $30cm$ and mass $60mg$ lies in a direction 30° east of north.The earth's magnetic field at this is horizontal and has a magnitude of $0.8G$.What current must be passed through the wire,so that it may float in air ?

A. 5A

B. 25A

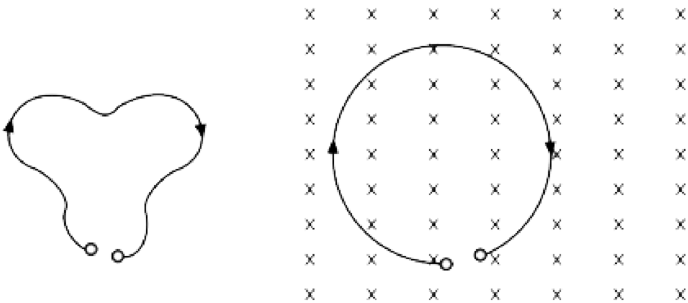
C. 50A

D. 75A

Answer: C

Watch Video Solution

10. A thin flexible wire of length L is connected to two adjacent fixed points and carries a current I in the clockwise direction, as shown in the figure. When the system is put in a uniform magnetic field of strength B going into the plane of the paper, the wire takes the shape of a circle. The tension in the wire is :



A. IBL

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

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

D. $\frac{IBL}{4\pi}$

Answer: C

Watch Video Solution

11. The ratio of the magnetic field at the centre of a current carrying circular coil to its magnetic moment is x. If the current and radius both are doubled the new ratio will become

A. 2x

B. x/2

C. x

D. x/8

Answer: C

Watch Video Solution

12. Two wires A and B are of lengths 40 cm and 30 cm. A is bent into a circle of radius r and B into an arc of radius r. A current i_1 is passed through A and i_2 through B. To have the same magnetic induction at the centre, the ratio of $i_1 : i_2$ is

A. $3:4$

B. $3:5$

C. $2:3$

D. $4:3$

Answer: A

Watch Video Solution

13. A circular coil of radius 2R is carrying current 'i' . The ratio of magnetic fields at the centre of the coil and at a point at a distance 6R from the centre of the coil on the axis of the coil is

A. 10

B. $10\sqrt{10}$

C. $20\sqrt{5}$

D. $20\sqrt{10}$

Answer: B

Watch Video Solution

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

A. $250\mu T$

B. $150\mu T$

C. $125\mu T$

D. $75\mu T$

Answer: A

Watch Video Solution

15. 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. ω, q and m

C. q and m

D. ω and m

Answer: C

Watch Video Solution

16. The field due to a wire of n turns and radius r which carries a current I is measure on the axis of the coil at a small distance h form the centre of the coil. This is smaller than the field at the centre by the fraction:

A. $\left(\frac{3}{2}\frac{h^2}{r^2}\right.$

B. $\frac{2}{3}\frac{h^2}{r^2}$

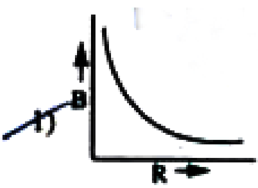
C. $\frac{3}{2}\frac{r^2}{h^2}$

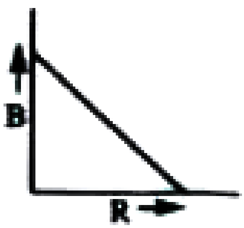
D. $\frac{2}{3}\frac{r^2}{h^3}$

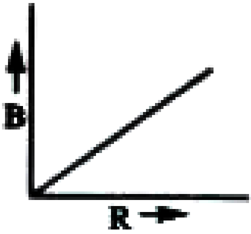
Answer: A

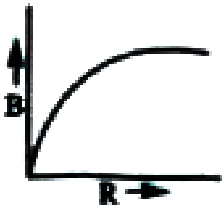
Watch Video Solution

17. A charge Q is uniformly distributed over the surgace of non conducting disc of radius R. The disc rotates about an axis perpendicular to its plane and passing through its centre with an angular velocity ω. As a result of this rotation a magnetic field of induction B is obtained at the centre of the disc. If we keep both the amount of charge placed on the disc and its angular velocity to be constant and vary the radius of the disc then the variation of the magnetic induction at the centre of the disc will be represented by the figure

A. 

B. 

C. 

D. 

Answer: A

Watch Video Solution

18. Two circular coils are made from a uniform copper wire. Radii of circular coils is in the ratio 3:4 and number of turns in the ratio 3:5. If they are connected in series across a battery.

Statement (A) : Ratio between magnetic field inductions at their centers is 4 : 5

Statement (B) : Ratio between effective magnetic moments of the two coils is 16 : 15

A. Both statements are wrong

B. Both statements are correct

C. Statement A alone is correct

D. Statement B alone is correct

Answer: C

Watch Video Solution

19. A straight wire is first bent into a circle of radius 'r' and then into a square of side 'x' each of oneturn. If currents flowing through them are in the ratio 4 : 5, the ratio of their effective magnetic moments is

A. $\frac{\pi}{8}$

B. $\frac{12}{5\pi}$

C. $\frac{16}{5\pi}$

D. $\frac{8}{5\pi}$

Answer: C

Watch Video Solution

20. 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 magnitude of the resultant magnetic induction in tesla at a point $2.0cm$ away from the wire is

A. 10^{-4}

B. 3×10^{-4}

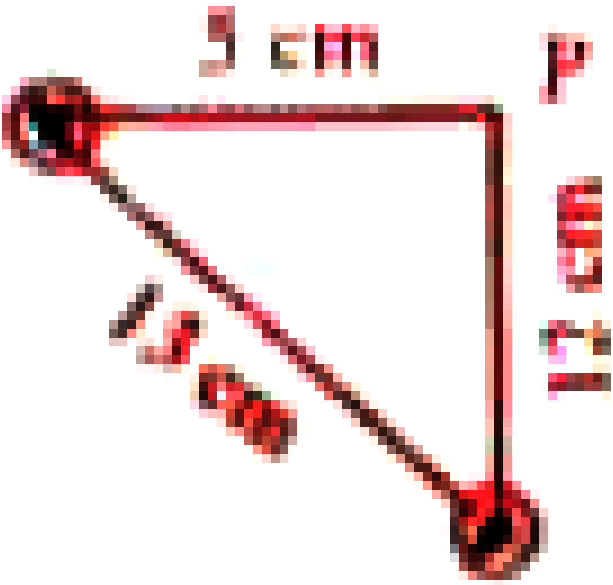
C. 5×10^{-4}

D. 6×10^{-4}

Answer: C

Watch Video Solution

21. Two long parallel conductors cany currents $i_1 = 3A$ and $i_2 = 3A$ both are directed into the plane of paper. The magnitude of resultant magnetic field at point 'P, is



A. $12\mu T$

B. $5\mu T$

C. $13\mu T$

D. $7.2\mu T$

Answer: C

Watch Video Solution

22. A straight wire of length (π^2) metre is carrying a current of 2 A and the magnetic field due to is measured at a point distance 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

Watch Video Solution

23. A long straight wire of radius a carries a steady current is uniformly distribution across its cross-section.Find the ratio of the magnetic field at $\frac{a}{2}$ and 2a

A. 1

B. $1/2$

C. $1/4$

D. 4

Answer: A

Watch Video Solution

24. The total magnetic induction at point O due to curved portion and straight portion in the following figure, will be

A. $\frac{\mu_0 i}{2\pi r}[\pi - \phi + \tan\phi]$

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

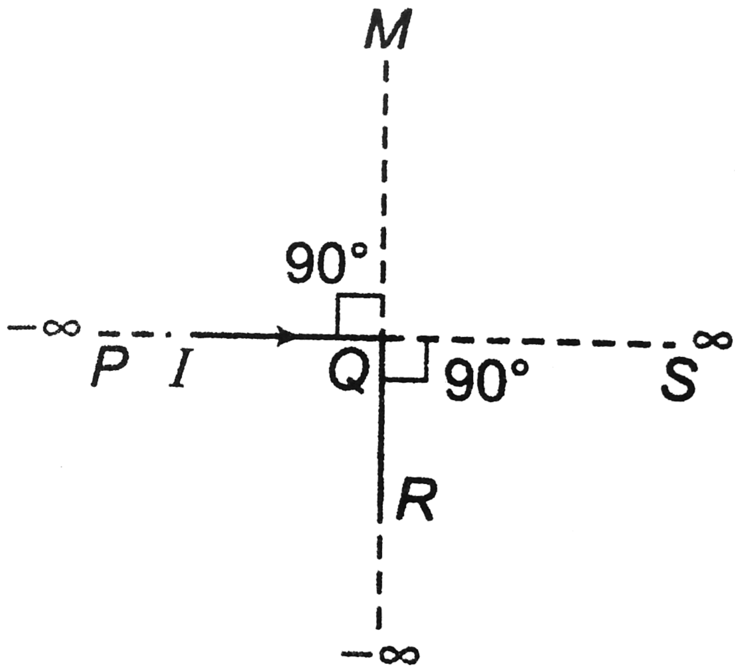
C. 0

D. $\frac{\mu_0 i}{\pi r}[\pi - \phi + \tan\phi]$

Answer: A

Watch Video Solution

25. An infifnitely long conductor PQR is bent to form a right angle as shown in figure. 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 current is $\frac{I}{2}$ in QR as well as in QS, the current in PQ remaining unchanged. The magnetic field at M is now H_2. The ratio $\frac{H_1}{H_2}$ is given by`



A. $1/2$

B. 1

C. $2/3$

D. 2

Answer: C

Watch Video Solution

26. A straight conductor of length 32 cm carries a current of 30A. Magnetic induction at a point which is in air at a perpendicular distance of 12cm from the mid point of the conductor is

A. 0.2 gauss

B. 0.3 gauss

C. 0.4 gauss

D. 0.5 gauss

Answer: C

Watch Video Solution

27. Two parallel long wires carry currents 18A and 3A. When the currents are in the same direction, the magnetic field at a point midway between the wire is B_1. If the direction of i_2 is reversed, the field becomes B_2. Then the value of B_1 / B_2 is

A. $5:7$

B. $7:5$

C. $3:5$

D. $5:3$

Answer: A

Watch Video Solution

28. A long straight wire along the Z-axis carries a current I in the negative z-direction. The magnetic vector field B at a point having coodinates (x, y) in the z = 0 plane is

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

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

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

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

Answer: A

Watch Video Solution

29. A wire carrying a current i is first bent in the form of a square of side a and placed at right angle to a uniform magnetic field of induction B. The work done in changing its shape' into a circle is

A. $ia^2B(\pi+2)$

B. $ia^2B(\pi-2)$

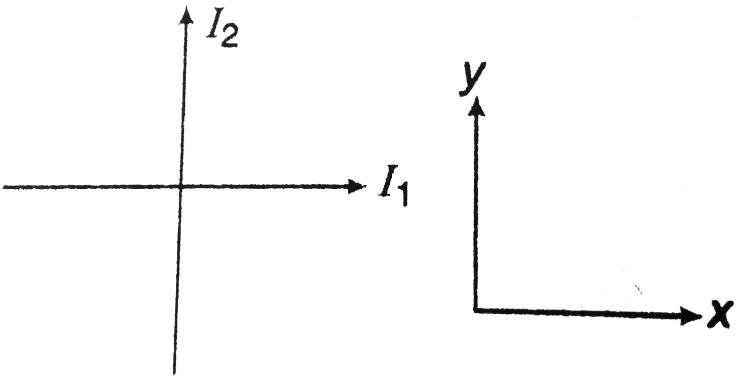
C. $ia^2B\left(\frac{4}{\pi}-1\right)$

D. $ia^2B\left(1-\frac{4}{\pi}\right)$

Answer: C

Watch Video Solution

30. Two long mutually perpendicular conductors carrying currents I_1 and I_2 lie in one plane, Find the locus of points at which the magnetic induction is zero.



A. $x = \frac{i_1}{i_2} y$

B. $y = \frac{i_1}{i_2} x$

C. $y = \frac{i_2^2}{i_1} x$

D. $x^2 + y^2 = \frac{i_1}{i_2}$

Answer: B

Watch Video Solution

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

A. $\frac{\sqrt{2}\pi^3}{32}$

B. $\frac{\sqrt{2}\pi^3}{64}$

C. $\frac{\sqrt{2}\pi^3}{16}$

D. $\frac{\sqrt{2}\pi^3}{8}$

Answer: A

Watch Video Solution

32. Current 'i' is flowing in heaxagonal coil of side a. The magnetic induction at the centre of the coil will be

A. $\frac{3\sqrt{3}\mu_0 i}{\pi a}$

B. $\frac{\mu_0 i}{3\sqrt{3}\pi a}$

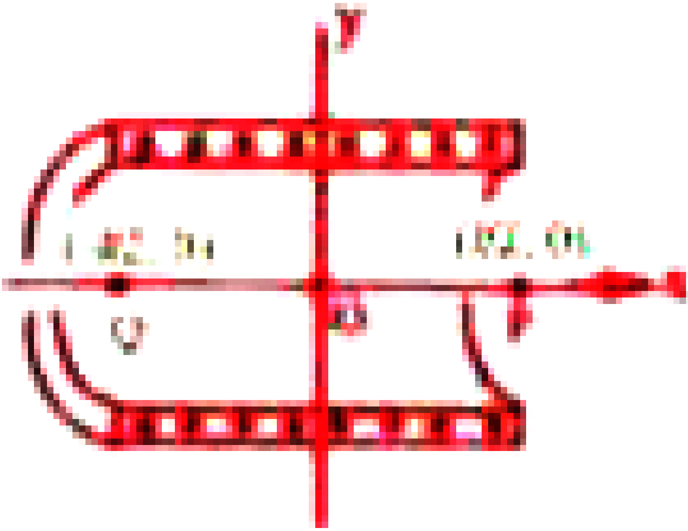
C. $\frac{\mu_0 i}{\sqrt{3}\pi a}$

D. $\frac{\sqrt{3}\mu_0 i}{\pi a}$

Answer: D

Watch Video Solution

33. A solenoid of length 'l' has N turns of wire closely spaced, each turn carrying a current i. If R is cross sectional radius of the solenoid, the magnetic induction at 'P'(only axial component).



A. $\frac{\mu_0 i N}{2\sqrt{R^2+l^2}}$

B. $\frac{\mu_0 i N}{2\sqrt{l^2+4R^2}}$

C. $\frac{\mu_0 N i}{2R^2+l^2}$

D. $\frac{\mu_0 N i}{4\sqrt{R^2+l^2}}$

Answer: A

Watch Video Solution

34. A toroid has a core (non-ferromagnetic) of inner radius 25 cm and outer radius 26 cm, around which 3500 turns of a wire are wound. If the current in the wire is 11 A, what is the magnetic field (a) outside the toroid, (b) inside the core of the toroid, and (c) in the empty space surrounded by the toroid.

A. $0, 3 \times 10^{-2} T, 0$

B. $3 \times 10^{-2} T, 0, 0$

C. $0, 0, 3 \times 10^{-2} T$

D. $3 \times 10^{-2} T, 0, 3 \times 10^{-2} T$

Answer: A

Watch Video Solution

35. A 3.0 cm wire carrying a current of 10 A is placed inside a solenoid perpendicular to its axis. The magnetic field inside the solenoid is given to be 0.27 T. What is the magnetic force on the wire?

A. $8.1 \times 10^{-2} N$

B. $1.8 \times 10^{-2} N$

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

D. $81 \times 10^{-2} N$

Answer: A

Watch Video Solution

36. A closely wound solenoid of 800 turns and area of cross-section $2.5 \times 10^4 m^2$ carries a current of 3.0A. Explain the sense in which the solenoid acts like a bar magnet. What is its associated magnetic moment?

A. 0.5 J/T

B. 0.3 J/T

C. 0.6 J/T

D. 0.8 J/T

Answer: C

Watch Video Solution

37. A closely would solenoid of 2000 turns and area of cross-section $1.6 \times 10^{-4} m^2$. Carrying a current of 4.0A. Is suspended through its centre allowing it to turn in a horizontal plane.

(a) What is the magnetic moment associated with the solenoid?

(b) What is the force and torque on the solenoid if a uniform horizontal mangetic field of $7.5 \times 10^{-2} T$ is set up at an angle of 30° the axis of the solenoid?

A. $1.28 Am^2, 0.042 Nm$

B. $1.28Am^2, 0.048Nm$

C. $2.28Am^2, 0.038Nm$

D. $1.28Am^2, 0.0038Nm$

Answer: B

Watch Video Solution

38. Two coaxial solenoids of different radii carry current I in the same direction. Let $\vec{F}_1$ be the magnetic force on the inner solenoid due to the outer one and $\vec{F}_2$ be the magnetic force on the outer solenoid due to the inner one. Then : $\vec{F}_1$ is radially inwards and $\vec{F}_2$ is radially outward

A. F_1 is radily outwards and $F_2 = 0$

B. $F_1 = F_2 = 0$

C. F_1 is radily inwards and F_2 is radily outwards

D. F_1 is radily inwards and $F_2 = 0$

Answer: B

Watch Video Solution

39. A solenoid has 10^3 turns per unit length. On passing a current of 2A, magnetic induction is measured to be $4\pi Wb/m^2$. Calculate magnetic susceptibility of core

A. 49999

B. 49

C. 499

D. 4999

Answer: D

Watch Video Solution

40. Currents of 10 A and 2A are passed through two parallel wires A and B respectuvely, in opposite direction.If the wire A is infinitely long on the wire B is 2 2m then the find the force acting on the conductor B which is situated at 10 cm distance from A

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

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

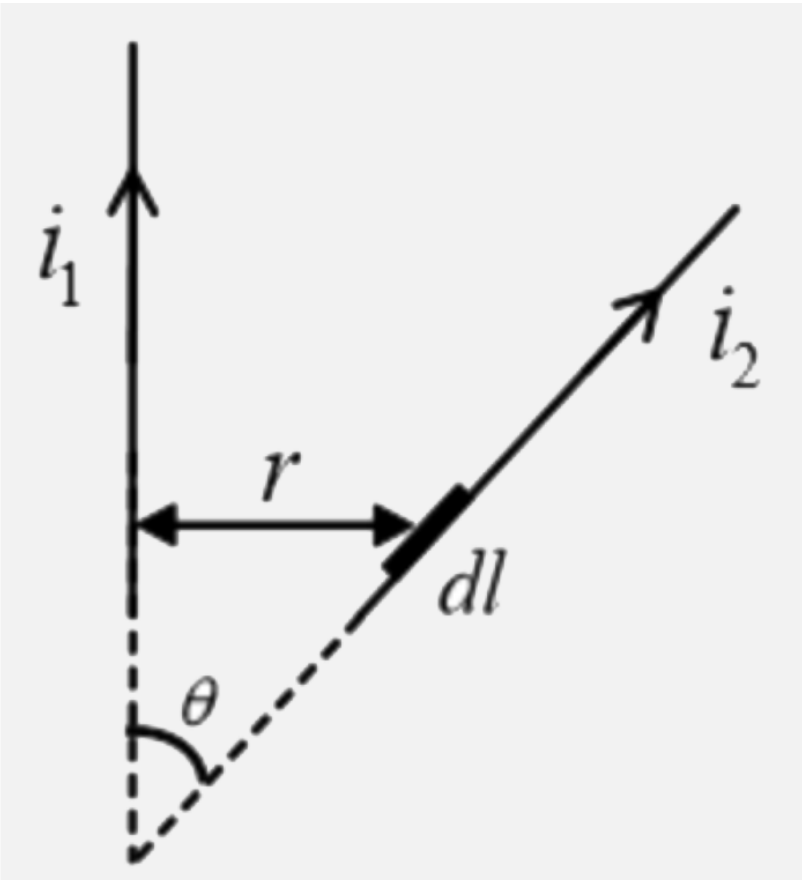
C. $4 \times 10^{-7} N$

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

Answer: A

Watch Video Solution

41. 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 the figure) due to the magnetic field of wire 1 ?



A. $\frac{\mu_0}{2\pi r} i_1 i_2 d < an\theta$

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

Watch Video Solution

42. Two parallel horizontal conductors are suspended by two light vertical threads each 75 cm long. Each conductor has a mass of $40 gm$, and when there is no current they are 0.5 cm apart. Equal current in the two wires result in a separation of 1.5 cm. Find the values and directions of currents. Take $g = 9.8 ms^{-2}$.

A. 14 A in same direction

B. 14 A in opposite direction

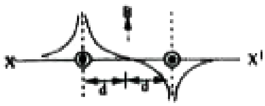
C. 196 A in same direction

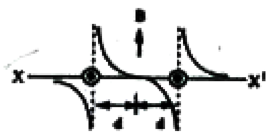
D. 196 A in opposite direction

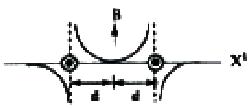
Answer: B

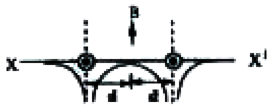
Watch Video Solution

43. Two long parallel wires are at a distance 2d apart. They carry steady equal current flowing out of the plane of the paper as shown. The variation of the magnetic field along the line xx' is given by :

A. 

B. 

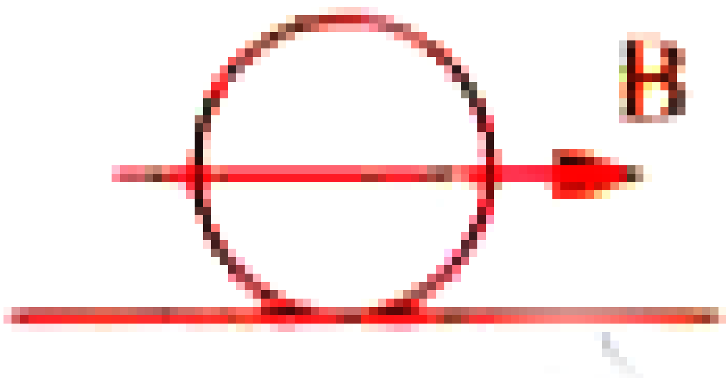
C. 

D. 

Answer: B

Watch Video Solution

44. A conducting ring of mass 2kg, radius 0.5m carries a current of 4A. It is placed on a smooth horizontal surface. When a horizontal magnetic field of 10 T parallel to the diameter of the ring is applied, the initial acceleration is (in rad/sec^2)



A. 5π

B. 20π

C. 40π

D. 10π

Answer: C

Watch Video Solution

45. A circular coil of 25 turns and radius 12 cm is placed in a uniform magnetic field of 0.5 T normal to the plane of the coil. If the current in the coil is 6 A then total torque acting on the coil is

A. $2.4 \times 10^{-4} Nm$

B. $2.4 Nm$

C. $0.24 Nm$

D. $0.024 Nm$

Answer: A

Watch Video Solution

46. A galvanometer having a resistance of 50Ω, gives a full scale deflection for a current of 0.05A. The length in metre of a resistance wire of area of cross - section $2.97 \times 10^{-2} cm^2$ that can be used to convert the galvanometer into an ammeter which can read a maximum of 5A current is (Specific resistance wire $= 5 \times 10^{-7} \Omega - m$)

A. 9

B. 6

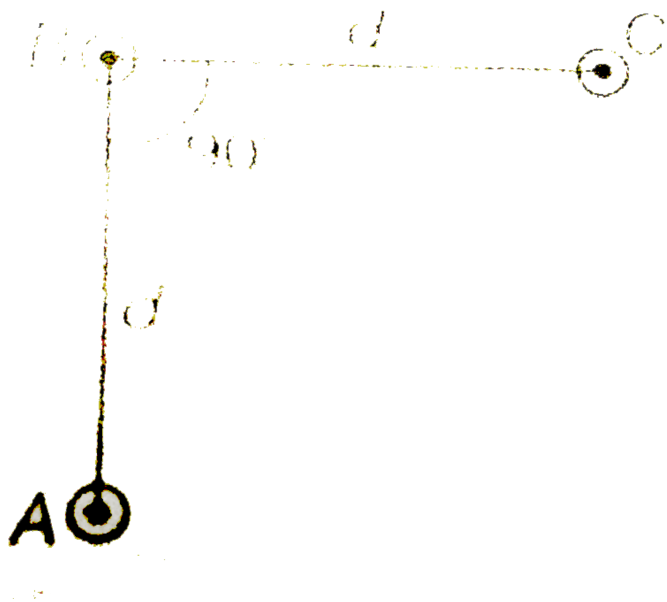
C. 3

D. 1.5

Answer: C

Watch Video Solution

47. An arrangement of three parallel straight wires pl,aced perpendicular to plane of paper carrying same current I along the same direction is shown in figure Magnitude of force per unit length on the middle wire B is given by



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

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

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

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

Answer: A

Watch Video Solution

48. The deflection of a galvanometer falls to $1/10^{th}$ when a resistance of 5Ω is connected in parallel with it. If an additional resistance of 2Ω is connected in parallel to the galvanometer, the deflection is

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

B. $\frac{1}{16}th$

C. $\frac{2}{65}th$

D. $\frac{3}{36}th$

Answer: C

Watch Video Solution

49. A metallic rod of mass per unit length 0.5 kg m^{-1} is lying horizontally on a smooth inclined plane which makes an anlge of 30° with the horizontal. The rod is not allowed to slide down by a flowing a current through it when a magnetic field of intuctioni 0.25 T is acting on it in the vertical direction. The current flowing in the rod to keep it stationary is

A. 7.14 S

B. 5.98 A

C. 11.32 A

D. 14.76 A

Answer: C

Watch Video Solution