ALLEN CAREER INSTITUTE KOTA (RAJASTHAN) path to success

PRE-MEDICAL

PHYSICS

ENTHUSIAST | LEADER | ACHIEVER

EXERCISE

Magnetic effect of current and Magnetism

HINDI MEDIUM

EXERCISE-I (Conceptual Questions) Build Up Your Understanding

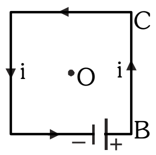
MAGNETIC FIELD & BIOT-SAVART LAW

1. A stationary magnet does not intereact with :-

(1) iron rod (2) moving charge
(3) moving magnet (4) stationary charge

MG0001

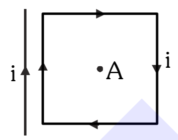
2. Following is square shape loop, whose one arm BC produces magnetic field B at the centre of coil. The resultant magnetic field due to all the arms will be :-



(1) 4B
(2) B/2
(3) B
(4) 2B

MG0002

3. A wire is parallel to one arm of a square current carrying loop, which also carries current. Now at any point A within the coil the magnetic field will be :-



(1) less than the magnetic field produced due to loop only.
(2) more than the magnetic field produced due to loop only.
(3) equal to the earlier.
(4) zero

MG0003

4. A current of 10 A is established in a long wire along positive z -direction. The magnetic field B at the point (1m, 0, 0) is :-

(1) 1 μT along the –y direction
(2) 2μT along the +y direction
(3) 1μT along the –x direction
(4) 2μT along the +x direction

MG0004

5. Radius of current carrying coil is 'R'. Then ratio of magnetic fields at the centre of the coil to the axial point, which is $R\sqrt{3}$ distance away from the centre of the coil :-

(1) 1 : 1 (2) 1 : 2 (3) 1 : 4 (4) 8 : 1

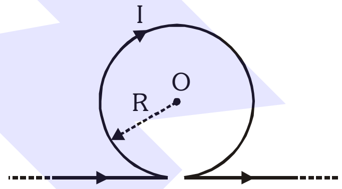
MG0005

6. A coil of one loop is made by a wire of length L and there after a coil of two loops is made by same wire. The ratio of magnetic field at the centre of coils respectively :-

(1) 1 : 4 (2) 1 : 1 (3) 1 : 8 (4) 4 : 1

MG0006

7. Magnetic field at point O will be :-



(1) $\frac{\mu_0 I}{2R} \otimes$ (2) $\frac{\mu_0 I}{2R} \odot$

(3) $\frac{\mu_0 I}{2R}\left(1-\frac{1}{\pi}\right) \otimes$ (4) $\frac{\mu_0 I}{2R}\left(1+\frac{1}{\pi}\right) \odot$

MG0007

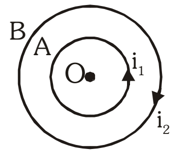
8. The vector form of Biot savart law for a current carrying element is :-

(1) $d\vec{B} = \frac{\mu_0}{4\pi}\frac{id\ell \sin\phi}{r^2}$ (2) $d\vec{B} = \frac{\mu_0}{4\pi}\frac{i\,d\vec{\ell} \times \hat{r}}{r^2}$

(3) $d\vec{B} = \frac{\mu_0}{4\pi}\frac{i\,d\vec{\ell} \times \hat{r}}{r^3}$ (4) $d\vec{B} = \frac{\mu_0}{4\pi}\frac{i\,d\vec{\ell} \times \vec{r}}{r^2}$

MG0008

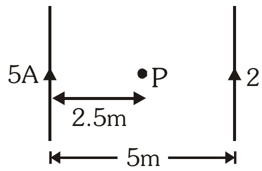
9. A and B are two concentric circular loop carrying current i_1 and i_2 as shown in figure. If ratio of their radii is 1:2 and ratio of the flux densities at the centre O due to A and B is 1:3 then the value of $\frac{i_1}{i_2}$ will be :-



(1) $\frac{1}{2}$ (2) $\frac{1}{3}$ (3) $\frac{1}{4}$ (4) $\frac{1}{6}$

MG0009

10. For the given current distribution the magnetic field at point, 'P' is :-



(1) $\frac{\mu_0}{4\pi}\odot$ (2) $\frac{\mu_0}{\pi}\otimes$

(3) $\frac{\mu_0}{2\pi}\otimes$ (4) $\frac{\mu_0}{2\pi}\odot$

MG0010

11. 1A current flows through an infinitely long straight wire. The magnetic field produced at a point 1m. away from it is :–

(1) 2×10^{-3} T (2) $\frac{2}{10}$T

(3) 2×10^{-7} T (4) $2\pi\times10^{-6}$ T

MG0011

12. Two infinite long parallel wires carry equal currents in same direction. The magnetic field at a mid point in between the two wire is :–

(1) Twice the magnetic field produced due to each of the wires

(2) Half of the magnetic field produced due to each of the wires

(3) Square of the magnetic field produced due to each of the wires

(4) Zero

MG0012

13. A closely wound flat circular coil of 25 turns of wire has diameter of 10 cm and carries a current of 4 ampere. Determine the magnetic flux density at the centre of the coil :-

(1) 1.679×10^{-5} T (2) 2.028×10^{-4} T

(3) 1.257×10^{-3} T (4) 1.512×10^{-6} T

MG0013

14. π ampere current is flowing through a long straight wire. Due to this a field of 5×10^{-5} T produced, then distance of the point from the axis of the wire is :-

(1) $10^4\mu_0$ m (2) $10^5\mu_0$ m

(3) $10^6\mu_0$ m (4) $10^8\mu_0$ m

MG0014

15. Radius of a current carrying coil is 'R'. The ratio of magnetic field at a axial point which is R distance away from the centre of the coil to the magnetic field at the centre of the coil :-

(1) $\left(\frac{1}{2}\right)^{1/2}$ (2) $\frac{1}{2}$

(3) $\left(\frac{1}{2}\right)^{3/2}$ (4) $\frac{1}{4}$

MG0015

16. When the current flowing in a circular coil is doubled and the number of turns of the coil in it is halved, the magnetic field at its centre will become :-

(1) Same (2) Four times

(3) Half (4) Double

MG0016

17. Which of the following statement is not true; magnetic field at the centre of current carrying loop :-

(1) proportional to current

(2) inversely proportional to radius

(3) proportional to number of turns

(4) none

MG0017

18. A circular coil of radius R carries an electric current. The magnetic field due the coil at a point on the axis of the coil located at a distance r from the center of the coil, such that r >> R varies as :-

(1) $1/r$ (2) $1/r^{3/2}$

(3) $1/r^2$ (4) $1/r^3$

MG0018

19. Two concentric circular loops of radii 0·08m and 0·1m carries current such that magnetic field at the centre is zero. If the current in the outer loop is 8A clockwise, current in the inner loop is :-

(1) 6·4 A anticlockwise

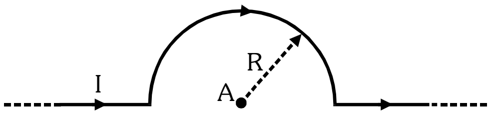
(2) 6·4 A clockwise

(3) 8A anticlockwise

(4) 3·2 A clockwise

MG0019

20. In the shown figure magnetic field at point A will be :-



(1) $\frac{\mu_0 I}{4\pi}$ (2) $\frac{\mu_0 I}{4R}$ (3) $\frac{\mu_0 I}{4\pi R}$ (4) Zero

MG0020

21. If radius of coil becomes two times and current becomes half then magnetic field at centre of the coil will be :-

(1) Two times (2) Four times
(3) Half (4) One fourth

MG0021

22. 2 A current is flowing in a circular loop of radius 1m. Magnitude of magnetic field at the centre of circular loop will be :-

(1) $\frac{\mu_0}{2}$ (2) $2\mu_0$ (3) μ_0 (4) $\frac{\mu_0}{2\pi}$

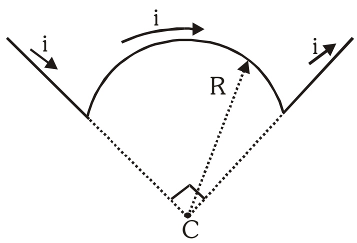
MG0022

23. A horizontal overhead powerline is at a height of 4m from the ground and carries a current of 100 A from east to west. The magnetic field directly below it on the ground is :-

(1) 2.5×10^{-7} T, southward
(2) 5×10^{-6} T, northward
(3) 5×10^{-6} T, southward
(4) 2.5×10^{-7} T, northward

MG0023

24. The wire in the figure carries a current i and consists of a circular arc of radius R and central angle $\frac{\pi}{2}$ rad, and two straight sections whose extensions intersect the centre C of the arc. The magnetic field $\vec{B}$ that the current produces at C is :-



(1) $|\vec{B}| = \frac{\mu_0 i}{8R}$ into the plane of the figure

(2) $|\vec{B}| = \frac{\mu_0 i}{8R}$ out of the plane of the figure

(3) $|\vec{B}| = \frac{\mu_0 i}{8\pi R}$ into the plane of the figure

(4) $|\vec{B}| = \frac{\mu_0 i}{8\pi R}$ out of the plane of the figure

MG0024

AMPERE'S LAW

25. For the hollow thin cylinderical current carrying pipe which statement is correct :-

(1) magnetic field inside the pipe is not zero
(2) magnetic field outside the pipe is zero
(3) electric field outside the pipe is zero
(4) electric field on the surface of pipe is zero

MG0025

26. In a current carrying long solenoid the field produced does not depend on :-

(1) number of turns per unit length
(2) current is solenoid
(3) radius of cross section of the solenoid
(4) all of the above

MG0026

27. If length and number of turns becomes half for a solenoid then value of magnetic field becomes:-

(1) twice (2) same
(3) half (4) one fourth

MG0027

28. If number of turns and current become double for any solenoid, then value of magnetic field becomes:-

(1) twice (2) same
(3) half (4) four times

MG0028

29. A current of $1/4\pi$ ampere is flowing through a toroid. It has 1000 number of turn per meter then value of magnetic field (in Wb/m^2) along its axis is :-

(1) 10^{-2} (2) 10^{-3}
(3) 10^{-4} (4) 10^{-7}

MG0029

30. Mean radius of a toroid is 10 cm and number of turns are 500. If current flowing through it is 0.1 ampere then value of magnetic field (in tesla) for toroid :-

(1) 10^{-2} (2) 10^{-5} (3) 10^{-3} (4) 10^{-4}

MG0030

31. A long solenoid has length L, average diameter D and n layer of turns. Each layer contains N turns. If current flowing through the solenoid is i the value of magnetic field at the centre :-

(1) Proportional to D

(2) Inversely proportional to D

(3) Does not depend on D

(4) Proportional to L

MG0031

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

(1) B/2 (2) B (3) 2B (4) 4B

MG0032

33. A long solenoid having 200 turns/cm and carries current i. Magnetic field at its axis is $6{\cdot}28 \times 10^{-2}$ wb/m^2. An another solenoid having having 100 turns/cm and carries $\frac{i}{3}$ current, then magnetic field at its axis will be :-

(1) 1.05×10^{-4} Wb/m^2

(2) 1.05×10^{-2} Wb/m^2

(3) 1.05×10^{-5} Wb/m^2

(4) 1.05×10^{-3} Wb/m^2

MG0033

MAGNETIC FORCE & MOVING CHARGE IN MAGNETIC FIELD

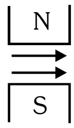
34. A proton and an alpha particle are separately projected in a region where a uniform magnetic field exists. The initial velocities are perpendicular to the direction of magnetic field. If both the particles move along circles of equal radii, the ratio of momentum of proton to alpha particle $\left(\frac{P_p}{P_\alpha}\right)$ is :-

(1) 1 (2) 1/2

(3) 2 (4) 1/4

MG0034

35. Cathode rays are moving between the poles of a magnet. Due to the effect of magnetic field of magnet :-



(1) velocity of rays increases

(2) velocity of rays decreases

(3) rays deflected towards south pole

(4) rays deflected in upward direction and perpendicular to the plane of the paper

MG0035

36. Following charge has maximum frequency of rotation in uniform transverse magnetic field :-

(1) a proton (2) an alpha particle

(3) an electron (4) a neutron

MG0036

37. Which of the following particle will experiences maximum magnetic force, when projected with the same velocity perpendicular to a magnetic field :-

(1) electron (2) proton (3) He^+ (4) Li^{++}

MG0037

38. When α and β rays are subjected to a magnetic field which is perpendicular to the direction of their motion, with their same speed. The curvature of path of both the particles are :-

(1) equal (2) more for α particles

(3) more for β particles (4) none

MG0038

39. Two identically charged particles A and B initially at rest, are accelerated by a common potential differene V. They enters into a uniform transverse magnetic field B and describe a circular path of radii r_1 and r_2 respectively then their mass ratio is :-

(1) $\left(\frac{r_1}{r_2}\right)^2$ (2) $\left(\frac{r_2}{r_1}\right)^2$

(3) $\left(\frac{r_1}{r_2}\right)$ (4) $\left(\frac{r_2}{r_1}\right)$

MG0040

40. An α-particle experiences a force of 3.84×10^{-14} N when its moves perpendicular to magnetic field of 0.2 Wb/m^2 then speed of the α - particle is :-

(1) 6.0×10^5 m/sec (2) 5.0×10^5 m/sec

(3) 1.2×10^6 m/sec (4) 3.8×10^6 m/sec

MG0041

41. If an electron enters a magnetic field with its velocity pointing in the same direction as the magnetic field then :–
(1) the electron will turn towards right
(2) the electron will turn towards left
(3) the velocity of the electron will increase
(4) the velocity of the electron will remain unchanged

MG0042

42. A charge having q/m equal to 10^8 C/kg and with velocity 3×10^5 m/s enters into a uniform magnetic field B = 0.3 tesla at an angle 30^0 with direction of field. Then radius will be :-
(1) 0.01 cm (2) 0.5 cm (3) 1 cm (4) 2 cm

MG0043

43. When a charged particle enters in a uniform magnetic field its kinetic energy :-
(1) remains constant (2) increases
(3) decreases (4) becomes zero

MG0044

44. Two particles x and y have equal charges and possessing equal kinetic energy enter in a uniform magnetic field and describe circular path of radius of curvature r_1 and r_2 respectively. The ratio of their masses is :-
(1) $\left(\frac{r_1}{r_2}\right)$ (2) $\left(\frac{r_1}{r_2}\right)^{1/2}$ (3) $\left(\frac{r_1}{r_2}\right)^2$ (4) $\left(\frac{r_2}{r_1}\right)$

MG0045

45. An electron having mass 'm' and kinetic energy E enter in uniform magnetic field B perpendicularly, then its frequency of uniform circular motion will be :-
(1) $\frac{eE}{qVB}$ (2) $\frac{2\pi m}{eB}$ (3) $\frac{eB}{2\pi m}$ (4) $\frac{2m}{eBE}$

MG0046

46. In a mass spectrograph an ion A of mass number 24 and charge +e and an ion B of mass number 22 and charge +2e are entered in transverse magnetic field with same velocity. The ratio of radii of their paths respectively :-
(1) $\frac{11}{24}$ (2) $\frac{12}{11}$ (3) $\frac{11}{22}$ (4) $\frac{24}{11}$

MG0047

47. A charge particle is moving in the direction of a magnetic field. The magnetic force acting on the particle :-
(1) is in the direction of its velocity
(2) is in the direction opposite to its velocity
(3) is perpendicular to its velocity
(4) is zero

MG0048

48. An electron of kinetic energy of 7.2×10^{-18} J is revolving on circular path in magnetic field 9×10^{-5} Wb/m^2 then radius of its circular path is:–
(1) 1.25 cm. (2) 2.5 m.
(3) 2.5 cm. (4) 25.0 cm.

MG0049

49. An electron moves with velocity v in uniform transverse magnetic field B on circular path of radius 'r', then e/m for it is :-
(1) $\frac{v}{Br}$ (2) $\frac{B}{rv}$ (3) Bvr (4) $\frac{vr}{B}$

MG0050

50. A proton, deutron and an α–particle are accelerated by same potential, enter in uniform magnetic field perpendicularly. Ratio of radii of circular path respectively :-
(1) $1 : \sqrt{2} : \sqrt{2}$ (2) 2 : 2 : 1
(3) 1 : 2 : 1 (4) 1 : 1 : 1

MG0051

51. A charged particle moves through a magnetic field in a direction perpendicular to it. Then the :-
(1) speed of the particle remains unchanged
(2) direction of motion of particle remains unchanged
(3) acceleration of particle remains unchanged
(4) velocity of particle remains unchanged

MG0052

52. A magnetic field :-
(1) Always exerts a force on charged particle
(2) Never exerts a force on charged particle
(3) Exert a force, if the charged particle is moving across the magnetic field line
(4) Exerts a force, if the charged particle is moving along the magnetic field line

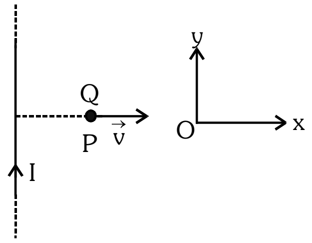
MG0053

53. A proton and an α-particle moving with the same velocity and enter into a uniform magnetic field which is acting normal to the plane of their motion. The ratio of the radii of the circular paths described by the proton and α-particle respectively :-

(1) 1 : 2 (2) 1 : 4
(3) 1 : 16 (4) 4 : 1

MG0054

54. 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 magnetic force on the charge is:-



(1) along ox
(2) opposite to oy
(3) along oy
(4) opposite to ox

MG0055

LORENTZ FORCE & MOTION OF CHARGED PARTICALS IN B

55. In Thomson mass spectrograph $\vec{E} \perp \vec{B}$ then the velocity of undeflected electron beam will be :–

(1) $\frac{|\vec{E}|}{|\vec{B}|}$ (2) $\vec{E} \times \vec{B}$ (3) $\frac{|\vec{B}|}{|\vec{E}|}$ (4) $\frac{E^2}{B^2}$

MG0056

56. Cyclotron is used to accelerate :-

(1) electrons (2) neutrons
(3) positive ions (4) negative ions

MG0057

57. A charge 'q' moves in a region where electric field and magnetic field both exist, then force on it :-

(1) $q(\vec{v} \times \vec{B})$ (2) $q\vec{E} + q(\vec{v} \times \vec{B})$
(3) $q\vec{E} + q(\vec{B} \times \vec{v})$ (4) $q\vec{B} + q(\vec{E} \times \vec{v})$

MG0058

58. An electric field E and a magnetic field B applied on a proton which moves with velocity v, it goes undeflected through the region if :-

(1) $E \perp B$
(2) E is parallel to v and perpendicular to B
(3) E, B and v all three mutually perpendicular to each other and v = E/B
(4) E and B both are parallel but perpendicular to v

MG0059

59. In a region constant uniform electric and magnetic field is present. Both field are parallel. In this region a charge released from rest, then path of particle is :-

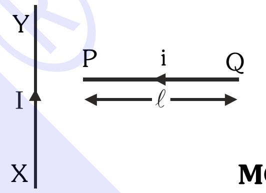
(1) Circle (2) Helical
(3) Straight line (4) Ellipse

MG0060

FORCE ON A CURRENT-CARRYING CONDUCTOR

60. A wire PQ carries a current 'i' is placed perpendicular to a long wire XY carrying a current I. The direction of force on PQ will be:-

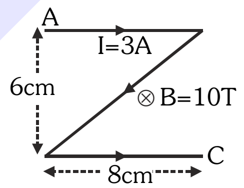
(1) towards right
(2) towards left
(3) upwards
(4) downwards



MG0061

61. A current carrying wire AC is placed in uniform transverse magnetic field then the force on wire AC :-

(1) 3N
(2) 4.2N
(3) 6N
(4) 4N



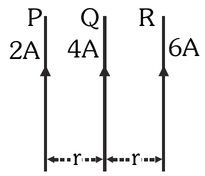
MG0062

62. Force exist on a current carrying wire which is placed in external magnetic field, due to :–

(1) free electrons in wire
(2) free positive ions in wire
(3) (1) & (2) both
(4) none

MG0063

63. P, Q and R long parallel straight wires in air, carrying currents as shown. The direction of resultant force on R is :-



(1) towards left
(2) towards right
(3) the same as that of current in Q
(4) perpendicular to plane of paper

MG0065

64. Two parallel wires in free space are 10 cm apart and each carries a current of 10 A in the same direction. The magnetic force per unit length of each wire is :-
(1) 2×10^{-4} N, attractive
(2) 2×10^{-4} N, repulsive
(3) 2×10^{-7} N, attractive
(4) 2×10^{-7} N, repulsive

MG0066

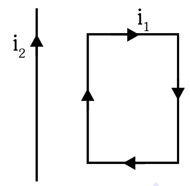
65. Wire in the form of a right angle ABC, with AB=3cm and BC = 4cm, carries a current of 10A. There is a uniform magnetic field of 5T perpendicular to the plane of the wire. The force on the wire will be :-
(1) 1.5N (2) 2.0N (3) 2.5N (4) 3.5N

MG0067

66. When direct current passed through a spring then it :-
(1) Contracts (2) Expands
(3) Vibrate (4) Unchange

MG0069

67. A rectangular loop carrying a current i_1, is situated near a long straight wire carrying a steady current i_2. 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 :–



(1) move away from the wire
(2) move towards the wire.
(3) remain stationary.
(4) rotate about an axis parallel to the wire.

MG0070

68. A current carrying wire is arranged at any angle in an uniform magnetic field, then
(1) only force acts on wire
(2) only torque acts on wire
(3) both
(4) none

MG0071

69. Two parallel beams of positrons moving in the same direction will :-
(1) Repel to each other
(2) Will not interact with each other
(3) Attract to each other
(4) Be deflected normal to the plane containing the two beams

MG0072

CURRENT LOOP & MOVING COIL GALVANOMETER

70. Due to the flow of current in a circular loop of radius R, the magnetic field produced at the centre of the loop is B. The manetic moment of the loop is :-
(1) $BR^3/2\pi\mu_0$ (2) $2\pi BR^3/\mu_0$
(3) $BR^2/2\pi\mu_0$ (4) $2\pi BR^2/\mu_0$

MG0073

71. A circular loop has a radius of 5 cm. and it is carrying a current of 0.1 A. its magnetic moment is :–
(1) 1.32×10^{-4} amp-m^2
(2) 2.62×10^{-4} amp-m^2
(3) 5.25×10^{-4} amp-m^2
(4) 7.85×10^{-4} amp-m^2

MG0074

72. An electron is moving in a circle of radius 5.1×10^{-11} m. at a frequency of 6.8×10^{15} revolution/sec. The equivalent current is approximately :–
(1) 5.1×10^{-3} A (2) 6.8×10^{-3} A
(3) 1.1×10^{-3} A (4) 2.2×10^{-3} A

MG0075

73. If number of turn, area and current through the coil is given by n, A and i respectively then its magnetic moment will be :–
(1) niA (2) n^2iA (3) niA^2 (4) $\frac{ni}{\sqrt{A}}$

MG0076

74. An electron is moving around a proton in an orbit of radius 1Å and produces 16 Wb/m^2 of magnetic field at the centre, then find the angular velocity of electron :-
(1) $20\pi \times 10^{16}$ rad/sec
(2) 10×10^{16} rad/sec
(3) $\frac{5}{2\pi} \times 10^{16}$ rad/sec
(4) $\frac{5}{4\pi} \times 10^{16}$ rad/sec

MG0077

75. Current I is flowing in a conducting circular loop of radius R. It is kept in a magnetic field B which is perpendicular to the plane of circular loop, the magnetic force acting on the loop is :-

(1) IRB (2) 2πIRB (3) Zero (4) πIRB

MG0078

76. The unit of magnetic moment will be :-

(1) $\frac{A}{m}$ (2) A-m^2

(3) $\frac{T-m}{A}$ (4) $\frac{T-m}{A^2}$

MG0079

77. A current carrying coil behave like tiny magnet. If area of coil is A and magnetic moment is 'M' then current through the coil is :-

(1) $\frac{M}{A}$ (2) $\frac{A}{M}$ (3) MA (4) $\frac{A^2}{M}$

MG0080

78. An electron revolves with frequency 6.6×10^{15} r.p.s. around nucleus in circular orbit of radius 0.53 Å of hydrogen atom, then magnetic field produced at centre of orbit is :-

(1) 0.125 T (2) 1.25 T (3) 12.5 T (4) 125 T

MG0081

79. A current loop of area 0.01m^2 and carrying a current of 10A is held perpendicular to a magnetic field of 0.1T, the torque in N–m acting on the loop is :-

(1) 0 (2) 0.001 (3) 0.01 (4) 1.1

MG0082

80. The magnetic moment (μ) of a revolving electron around the nucleus varies with principal quantum number n as :-

(1) $\mu \propto n$ (2) $\mu \propto 1/n$

(3) $\mu \propto n^2$ (4) $\mu \propto 1/n^2$

MG0083

81. A current carrying coil is placed in a constant uniform magnetic field B. Torque is maximum on this coil when plane of coil is :-

(1) perpendicular to B (2) parallel to B

(3) at 45° to B (4) at 60° to B

MG0084

82. Magnetic field is parallel to the plane of coil then torque will be :-

(1) Maximum (2) Minimum

(3) Zero (4) None of these

MG0085

BAR MAGNET

83. The work done in rotating a magnet of magnetic moment M by an angle of 90° from the external magnetic field direction is 'n' times the corresponding work done to turn it through an angle of 60°. Where 'n' gives by :-

(1) 1/2 (2) 2 (3) 1/4 (4) 1

MG0086

84. Magnetic field lines produced by a bar magnet, cuts each other :–

(1) At neutral points

(2) Near the poles of the magnets

(3) At equatorial axis

(4) Never intersects to each other

MG0087

EARTH MAGNETIC FIELD

85. If the angle of dip at two places are 30° and 45° respectively, then the ratio of horizontal component of earth's magnetic field at two places assuming magnitude of total magnetic field of earth is same, will be :-

(1) $\sqrt{3}:\sqrt{2}$ (2) $1 : \sqrt{2}$

(3) $1 : \sqrt{3}$ (4) 1 : 2

MG0088

86. Two bar magnets having same geometry with magnetic moments M and 2M, are firstly placed in such a way that their similer poles are same side then its time period of osscilation is T_1. Now the polarity of one of the magnet is reversed then time period of osscilation is T_2, then :-

(1) $T_1 < T_2$

(2) $T_1 = T_2$

(3) $T_1 > T_2$

(4) $T_2 = \infty$

MG0089

87. Magnetic field of earth is 0.3 gauss. A magnet oscillating with rate of 5 oscillation/min. How much the magnetic field of earth is increased, so the number of oscillations become 10 per min :-

(1) 0.3G (2) 0.6G

(3) 0.9G (4) 1.2G

MG0090

88. A magnet makes 40 oscillations per minute at a place having magnetic field of 0.1×10^{-5} T. At another place, it takes 2.5 sec to complete one vibration. The value of earth's horizontal field at that place is :-

(1) 0.25×10^{-6} T (2) 0.36×10^{-6} T

(3) 0.66×10^{-8} T (4) 1.2×10^{-6} T

MG0091

89. The magnetic needle of a tangent galvanometer is deflected at an angle 30°. The horizontal component of earth's magnetic field 0.34×10^{-4} T is along the plane of the coil. The mangeitc field of coil :-

(1) 1.96×10^{-4} T (2) 1.96×10^{-5} T

(3) 1.96×10^{4} T (4) 1.96×10^{5} T

MG0092

MAGNETIC PROPERTIES OF MATERIALS

90. For protecting a magnetic needle it should be placed :-

(1) in an iron box (2) in wooden box

(3) in metallic box (4) none of these

MG0093

91. Which of the following materials is repelled by an external magnetic field :-

(1) Iron (2) Cobalt

(3) Steel (4) Copper

MG0094

92. If a diamagnetic material is placed in a magnetic field, the flux density inside the material compared to that outside will be :

(1) Slightly less (2) Slightly more

(3) Very much more (4) Same

MG0095

93. To protect a sensitive instrument from external megnetic jerks, it should be placed in a container made of :-

(1) Nonmagnetic substance

(2) Diamagnetic substance

(3) Paramagnetic substance

(4) Ferromagnetic substance

MG0096

94. Substances in which the magnetic moment of a single atom is not zero, are known as :-

(1) Diamagnetic (2) Ferromagnetic

(3) Paramagnetic (4) (2) and (3) both

MG0097

95. Susceptibility of a magnetic substance is found to depend on temperature and the strength of the magnetising field. The material is a :-

(1) Diamagnetic (2) Ferromagnetic

(3) Paramagnetic (4) Superconductor

MG0098

96. Property possessed by only ferromagnetic substance is :-

(1) Attracting magnetic substance

(2) Hysteresis

(3) Susceptibility independent of temperature

(4) Directional property

MG0099

97. The hard ferromagnetic material is characterized by :-

(1) Narrow hysteresis loop

(2) Broad hysteresis loop

(3) High mechanically hardness, all over

(4) Mechanically hard surface

MG0100

98. The magnetic moment of paramagnetic materials is :-

(1) Infinity (2) Zero

(3) Constant but low (4) None of above

MG0101

99. The cause of paramagnetism is :-

(1) Unparied electrons

(2) Electron excess and spin motion of electrons

(3) Paired electrons and orbital motion of electrons

(4) Electrons and orbital motion of electrons

MG0102

100. The cause of diamagnetism is :-

(1) Orbtital motion of electrons

(2) Spin motion of electrons

(3) Paired electrons

(4) None of the above

MG0103

101. The magnetic moment of diamagnetic materials is :-

(1) Infinity

(2) Zero

(3) 100 amp–m^2

(4) None of the above

MG0104

102. Which of the following statements is correct for diamagnetic materials :-

(1) $\mu_r < 1$

(2) χ is negative and low

(3) χ does not depend on temperature

(4) All of the above

MG0105

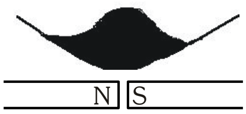
103. The area of B–H loop for soft iron, as compared to that for steel is :-

(1) More (2) Less

(3) Equal (4) None of the above

MG0106

104. The liquid in the watch glass in the following figure is -



(1) Ferromagnetic

(2) Paramagnetic

(3) Diamagnetic

(4) Nonmagnetic

MG0107

105. Powerful permanent magnets are made of :-

(1) Cobalt

(2) Aluminum

(3) Tin–coal

(4) Cobalt–steel

MG0108

106. Which of the following statements is correct for ferromagnetic material :-

(1) These become diamagnetic at Curie temperature

(2) These become paramagnetic at Curie temperature

(3) Their magnetic susceptibility becomes zero at Curie temperature

(4) Its magnetic properties are explained on the basis of electron principle

MG0109

107. A material rod, when placed in a strong magnetic field, aligns itself at right angles to the magnetic field. The nature of material is :-

(1) Diamagnetic (2) Paramagnetic

(3) Ferromagnetic (4) Low ferromagnetic

MG0110

108. The relative permeability of air is :-

(1) Zero (2) 1.04 (3) Infinity (4) 1

MG0111

109. If the magnetic susceptibility of a magnetic material is –0.004 then its nature will be :-

(1) Diamagnetic (2) Paramagnetic

(3) Ferromagnetic (4) Non magnetic

MG0112

110. The correct measure of magnetic hardness of a material is :-

(1) Ramnant magnetism

(2) Hysteresis loss

(3) Coercivity

(4) Curic temperature

MG0113

111. If the relative permeability of a material is 0.9999 then its nature will be :-

(1) Paramagnetic (2) Diamagnetic

(3) Ferromagnetic (4) Non–magnetic

MG0114

112. The magnetic susceptibility of a paramagnetic material at –73°C is 0.0075 then its value at –173°C will be :-

(1) 0.0045 (2) 0.0030

(3) 0.015 (4) 0.0075

MG0115

113. When a magnetic substance is heated, then it :

(1) Becomes a strong magnet

(2) Losses its magnetism

(3) Does not effect the magnetism

(4) Either (1) or (3)

MG0116

114. Diamagnetic substance are :-

(1) Feebly attracted by magnets

(2) Strongly attracted by magnets

(3) Feebly repelled by magnets

(4) Strongly repelled by magnets

MG0117

115. If a diamagnetic solution is poured into a U-tube and one arm of this U-tube placed between the poles of a strong magnet with the meniscus in a line with the field, then the level of the solution will :-

(1) Rise (2) Fall
(3) Oscillate slowly (4) Remain as such

MG0118

116. Magnetic permeability is maximum for :

(1) Diamagnetic substance
(2) Paramagnetic substance
(3) Ferromagnetic substance
(4) All of these

MG0119

117. Which one of the following is ferro-magnetic :-

(1) Co (2) Zn
(3) Hg (4) Pt

MG0120

118. For paramagnetic materials magnetic susceptibility is related with temperature as :-

(1) $\propto T^2$ (2) $\propto T^1$
(3) $\propto T^{-1}$ (4) $\propto T^{-2}$

MG0121

119. According to Curie's law, the magnetic susceptibility of a substance at an absolute temperature T is proportional to :-

(1) $1/T$ (2) T
(3) $1/T^2$ (4) T^2

MG0122

120. A diamagnetic material in a magnetic field moves

(1) from stronger to the weaker parts of the field
(2) from weaker to the stronger parts of the field
(3) perpendicular to the field
(4) in none of the above directions

MG0123

121. Diamagnetic substances characterise by :-

(1) low and negative magnetic suceptibility
(2) low and positive magnetic suceptibility
(3) high and negative magnetic suceptibility
(4) high and positive magnetic suceptibility

MG0124

122. Magnetic suceptibility of a diamagnetic substance varies with absolute temperature as :-

(1) directly proportional to T
(2) inversely proportional to T
(3) remains unchanged with T
(4) exponential decrease with T

MG0125

123. The material of permanent magnet has

(1) High retentivity, low coercivity
(2) Low retentivity, high coercivity
(3) Low retentivity, low coercivity
(4) High retentivity, high coercivity

MG0126

124. Hysteresis property is shown by :-

(1) paramagnetic and diamagnetic
(2) diamagnetic
(3) paramagnetic
(4) ferromagnetic

MG0127

125. Magnetic susceptibility of the following is :

(1) negative for diamagnetic
(2) positive for diamagnetic and paramagnetic
(3) negative for diamagnetic and zero for paramagnetic
(4) zero for paramagnetic and positive for ferromagnetic

MG0128

126. Which statement is true :

(1) atomic magnetic dipole moment of diamagnet is zero
(2) atomic magnetic dipole moment of para-magnet is zero
(3) atomic magnetic dipole moment of ferro-magnet is zero
(4) ferromagnet is demagnetised rapidly after moving in magnetising field.

MG0129

127. Curie-Weiss law is obeyed by iron at a temperature.......

(1) Below Curie temperature
(2) Above Curie temperature
(3) At Curie temperature only
(4) At all temperatures

MG0130

128. Ferromagnetic substance contain :-

(1) empty subshell

(2) partially empty subshell

(3) full fill subshell

(4) none of these

MG0131

129. Soft iron is used to make the core of transformer, because of its :

(1) low coercivity and low retentivity

(2) low coercivity and high retentivity

(3) high coercivity and high retentivity

(4) high coercivity and low retentivity

MG0132

130. Above curie temperature ferromagnetic substance converts into :

(1) paramagnetic (2) diamagnetic

(3) ferromagnetic (4) non magnetic

MG0133

131. Relation between μ_r and χ will be :

(1) $\mu_r = 1 + \chi$ (2) $\chi = \mu_r + 1$

(3) $\frac{\mu_0}{\mu}$ (4) $\mu_0\chi$

MG0134

EXERCISE-I (Conceptual Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**4**	**1**	**2**	**2**	**4**	**1**	**3**	**2**	**4**	**3**	**3**	**4**	**3**	**1**	**3**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**1**	**4**	**4**	**1**	**2**	**4**	**3**	**3**	**1**	**3**	**3**	**2**	**4**	**3**	**4**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	**3**	**2**	**2**	**2**	**4**	**3**	**4**	**3**	**1**	**1**	**4**	**2**	**1**	**3**	**3**
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	**4**	**4**	**4**	**1**	**1**	**1**	**3**	**1**	**3**	**1**	**3**	**2**	**3**	**3**	**4**
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	**1**	**1**	**1**	**1**	**3**	**1**	**2**	**1**	**1**	**2**	**4**	**3**	**1**	**2**	**3**
Que.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans.	**2**	**1**	**3**	**1**	**1**	**2**	**1**	**2**	**4**	**1**	**1**	**3**	**2**	**2**	**1**
Que.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Ans.	**4**	**1**	**4**	**4**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**4**	**2**	**2**	**4**
Que.	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	**2**	**1**	**2**	**1**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**1**	**3**	**1**	**1**
Que.	121	122	123	124	125	126	127	128	129	130	131				
Ans.	**1**	**3**	**4**	**4**	**1**	**1**	**2**	**2**	**1**	**1**	**1**				

EXERCISE-II (Previous Year Questions) AIPMT/NEET

AIPMT 2006

1. 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 the

(1) angle between $\vec{v}$ and $\vec{B}$ is necessary 90°

(2) angle between $\vec{v}$ and $\vec{B}$ can have at value other than 90°

(3) angle between $\vec{v}$ and $\vec{B}$ can have at value other than zero and 180°

(4) angle between $\vec{v}$ and $\vec{B}$ is either zero or 180°

MG0135

AIPMT 2007

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

(1) depends on R and not on v

(2) depends on v and not on R

(3) depends on both R and v

(4) is independent of both R and v

MG0138

3. A charged particle (q) is moving in a circle of radius R with uniform speed v. The associated magnetic moment μ is given by :-

(1) q v R

(2) q v R/2

(3) $q\ v\ R^2$

(4) $qv\ R^2/2$

MG0139

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

(1) along a straight line

(2) in an elliptical orbit

(3) in a circular orbit

(4) along a parabolic path

MG0140

5. 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:

(1) R (2) $\frac{1}{R}$

(3) $\frac{1}{R^2}$ (4) R^2

MG0141

6. Nickel shows ferromagnetic property at room temperature. If the temperature is increased beyond Curie temperature then it will show :-

(1) diamagnetism

(2) paramagnetism

(3) anti ferromagnetism

(4) no magnetic property

MG0142

AIPMT 2008

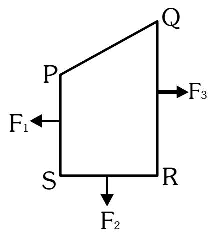
7. A particle of mass m, charge Q and kinetic energy T enters a transverse uniform magnetic field of induction $\vec{B}$. After 3 seconds the kinetic energy of the particle will be:-

(1) T (2) 4 T

(3) 3T (4) 2T

MG0143

8. A closed loop PQRS carrying a current is placed in a uniform magnetic field. If the magnetic forces on segments PS, SR and RQ are F_1, F_2 and F_3 respectively and are in the plane of the paper and along the directions shown, the force on the segment QP is :-



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

(2) $F_3 - F_1 - F_2$

(3) $F_3 - F_1 + F_2$

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

MG0144

AIPMT 2009

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

(1) 8N in z-direction (2) 8N in –z direction
(3) 4N in z-direction (4) 8N in y-direction

MG0145

AIPMT 2010

10. A square current carrying loop is suspended in a uniform magnetic field acting in the plane of the loop. If the force on one arm of the loop is $\vec{F}$, the net force on the remaining three arms of the loop is :-

(1) $\vec{F}$ (2) $3\vec{F}$ (3) $-\vec{F}$ (4) $-3\vec{F}$

MG0146

11. A thin ring of radius R meter has charge q coulomb uniformly spread on it. The ring rotates about its axis with a constant frequency of f revolutions/s. The value of magnetic induction in Wb/m^2 at the centre of the ring is :-

(1) $\frac{\mu_0 qf}{2R}$ (2) $\frac{\mu_0 qf}{2\pi R}$ (3) $\frac{\mu_0 q}{2\pi fR}$ (4) $\frac{\mu_0 q}{2fR}$

MG0147

12. 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 the two semicircular parts at their common centre is :-

(1) $\frac{\mu_0 i}{2R}$ (2) $\frac{\mu_0 i}{4R}$ (3) $\frac{\mu_0 i}{\sqrt{2}R}$ (4) $\frac{\mu_0 i}{2\sqrt{2}R}$

MG0148

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

(1) 1.5×10^{-3} N.m (2) 1.5×10^{-2} N.m
(3) 3×10^{-2} N.m (4) 3×10^{-3} N.m

MG0149

14. A particle having a mass of 10^{-2} kg carries a charge of 5×10^{-8}C The particle is given an initial horizontal 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 $\vec{B}$ and $\vec{E}$ are mutually perpendicular and perpendicular to the direction of velocity

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

Which one of the following pairs of statements is possible. ?

(1) (c) and (d) (2) (b) and (c)
(3) (b) and (d) (4) (a) and (c)

MG0150

AIPMT (Pre) 2010

15. Electromagnets are made of soft iron because soft iron has :-

(1) High retentivity and low coercive force
(2) Low retentivity and high coercive force
(3) High retentivity and high coercive force
(4) Low retentivity and low coercive force

MG0151

16. A vibration magnetometer placed in magnetic meridian has a small bar magnet. The magnet executes oscillations with a time period of 2 sec in earth's horizontal magnetic field of 24 microtesla. When a horizontal field of 18 microtesla is produced opposite to the earth's field by placing a current carrying wire, the new time period of magnet will be :-

(1) 4s (2) 1s
(3) 2s (4) 3s

MG0152

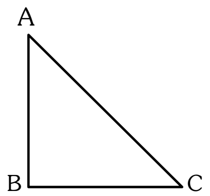
AIPMT (Mains) 2010

17. The magnetic moment of a diamagnetic atom is:-
(1) 1
(2) Between zero and one
(3) Equal to zero
(4) Much greater than one

MG0153

AIPMT (Pre) 2011

18. A current carrying closed loop in the form of a right angle isosceles triangle ABC is placed in a uniform magnetic field acting along AB. If the magnetic force on the arm BC is $\vec{F}$, the force on the arm AC is :



(1) $-\sqrt{2}\vec{F}$ (2) $-\vec{F}$
(3) $\vec{F}$ (4) $\sqrt{2}\vec{F}$

MG0158

19. A uniform electric field and a uniform magnetic field are acting along the same direction in a certain region. If an electron is projected in the region such that its velocity is pointed along the direction of fields, then the electrons :
(1) will turn towards right of direction of motion
(2) speed will decrease
(3) speed will increase
(4) will turn towards left of direction of motion

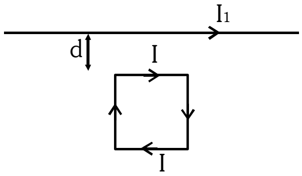
MG0159

20. There are four light-weight rod samples A,B,C D separately suspended by threads. A bar magnet is slowly brought near each sample and the following observations are noted :-
(i) A is feebly repelled
(ii) B is feebly attracted
(iii) C is strongly attracted
(iv) D remains unaffected
Which one of the following is true ?
(1) B is of a paramagnetic material
(2) C is of a diamagnetic material
(3) D is of a ferromagnetic material
(4) A is of a non-magnetic material

MG0160

AIPMT (Mains) 2011

21. 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 conductor as shown in figure. The loop will experience:-



(1) A net attractive force towards the conductor
(2) A net repulsive force away from the conductor
(3) A net torque acting upward perpendicular to the horizontal plane
(4) A net torque acting downward normal to the horizontal plane

MG0161

AIPMT (Pre) 2012

22. An alternating electric field, of frequency ν, is applied across the dees (radius = R) of a cyclotron that is being used to accelerate protons (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:-

(1) $B = \frac{2\pi m\nu}{e}$ and $K = 2m\pi^2\nu^2R^2$

(2) $B = \frac{m\nu}{e}$ and $K = m^2\pi\nu R^2$

(3) $B = \frac{m\nu}{e}$ and $K = 2m\pi^2\nu^2R^2$

(4) $B = \frac{2\pi m\nu}{e}$ and $K = m^2\pi\nu R^2$

MG0165

AIPMT (Mains) 2012

23. A proton carrying 1 MeV kinetic energy is moving in a circular path of radius R in uniform magnetic field. What should be the energy of an α-particle to describe a circle of same radius in the same field?
(1) 0.5 MeV
(2) 4 MeV
(3) 2 MeV
(4) 1 MeV

MG0166

NEET-UG 2013

24. A current loop in a magnetic field :-
(1) Can be in equilibrium in two orientations, one stable while the other is unstable.
(2) Experiences a torque whether the field is uniform or non uniform in all orientations
(3) Can be in equilibrium in one orientation
(4) Can be in equilibrium in two orientations, both the equilibrium states are unstable

MG0171

25. 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. The electric and magnetic fields in the room are :-

(1) $\frac{ma_0}{e}$ east, $\frac{3ma_0}{ev_0}$ down

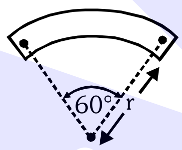
(2) $\frac{ma_0}{e}$ west, $\frac{2ma_0}{ev_0}$ up

(3) $\frac{ma_0}{e}$ west, $\frac{2ma_0}{ev_0}$ down

(4) $\frac{ma_0}{e}$ east, $\frac{3ma_0}{ev_0}$ up

MG0172

26. A bar magnet of length 'ℓ' and magnetic dipole moment 'M' is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be :-



(1) $\frac{M}{2}$ (2) M (3) $\frac{3}{\pi}M$ (4) $\frac{2}{\pi}M$

MG0173

AIPMT 2014

27. 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 I_1 and I_2 currents respectively. Point 'P' is lying at distance 'd' from 'O' along a direction perpendicular to the plane containing the wires. The magnetic field at the point 'P' will be :-

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

(3) $\frac{\mu_0}{2\pi d}(I_1^2-I_2^2)$ (4) $\frac{\mu_0}{2\pi d}(I_1^2+I_2^2)^{1/2}$

MG0176

AIPMT 2015

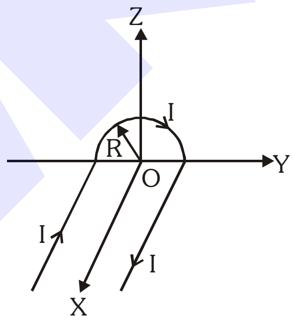
28. An electron moving in a circular orbit of radius r makes n rotations per second. The magnetic field produced at the centre has magnitude :

(1) Zero (2) $\frac{\mu_0 n^2 e}{r}$

(3) $\frac{\mu_0 ne}{2r}$ (4) $\frac{\mu_0 ne}{2\pi r}$

MG0180

29. 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 Y-Z plane. Magnetic field at point O is :



(1) $\vec{B}=-\frac{\mu_0}{4\pi}\frac{I}{R}(\pi\hat{i}-2\hat{k})$

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

(3) $\vec{B}=\frac{\mu_0}{4\pi}\frac{I}{R}(\pi\hat{i}-2\hat{k})$

(4) $\vec{B}=\frac{\mu_0}{4\pi}\frac{I}{R}(\pi\hat{i}+2\hat{k})$

MG0181

Re-AIPMT 2015

30. A rectangular coil of length 0.12m and width 0.1m 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 2 A. 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 :

(1) 0.12 Nm (2) 0.15 Nm
(3) 0.20 Nm (4) 0.24 Nm

MG0182

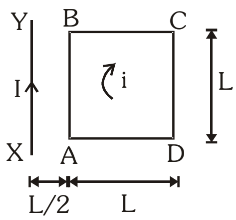
31. A proton and an alpha particle both enter a region of uniform magnetic field, B, moving at right angles to the field B. If the radius of circular orbits for both the particles is equal and the kinetic energy acquired by proton is 1 MeV, the energy acquired by the alpha particle will be :-

(1) 1 MeV (2) 4 MeV
(3) 0.5 MeV (4) 1.5 MeV

MG0183

NEET-I 2016

32. A square loop ABCD carrying a current i, is placed near and coplanar with a long straight conductor XY carrying a current I, the net force on the loop will be :-



(1) $\dfrac{2\mu_0 Ii}{3\pi}$ (2) $\dfrac{\mu_0 Ii}{2\pi}$

(3) $\dfrac{2\mu_0 IiL}{3\pi}$ (4) $\dfrac{\mu_0 IiL}{2\pi}$

MG0192

33. The magnetic susceptibility is negative for :

(1) diamagnetic material only
(2) paramagnetic material only
(3) ferromagnetic material only
(4) paramagnetic and ferromagnetic materials

MG0193

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

(1) $\dfrac{1}{4}$ (2) $\dfrac{1}{2}$ (3) 1 (4) 4

MG0194

NEET-II 2016

35. 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 :-

(1) 2nB (2) $2n^2B$
(3) nB (4) n^2B

MG0195

36. A bar magnet is hung by a thin cotton thread in a uniform horizontal magnetic field and is in equilibrium state. The energy required to rotate it by 60° is W. Now the torque required to keep the magnet in this new position is :-

(1) $\dfrac{\sqrt{3}W}{2}$ (2) $\dfrac{2W}{\sqrt{3}}$ (3) $\dfrac{W}{\sqrt{3}}$ (4) $\sqrt{3}\,W$

MG0196

37. An electron is moving in a circular path under the influence of a transverse magnetic field of 3.57×10^{-2} T. If the value of e/m is 1.76×10^{11} C/kg, the frequency of revolution of the electron is :-

(1) 62.8 MHz (2) 6.28 MHz
(3) 1 GHz (4) 100 MHz

MG0197

NEET(UG) 2017

38. If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then the true angle of dip θ is given by :-

(1) $\tan^2\theta = \tan^2\theta_1 + \tan^2\theta_2$
(2) $\cot^2\theta = \cot^2\theta_1 - \cot^2\theta_2$
(3) $\tan^2\theta = \tan^2\theta_1 - \tan^2\theta_2$
(4) $\cot^2\theta = \cot^2\theta_1 + \cot^2\theta_2$

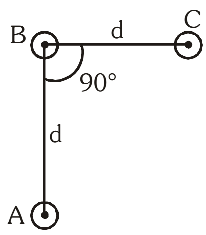
MG0202

39. A 250-Turn rectangular coil of length 2.1 cm and width 1.25 cm carries a current of 85 μA and subjected to magnetic field of strength 0.85 T. Work done for rotating the coil by 180° against the torque is:-

(1) 4.55 μJ (2) 2.3 μJ
(3) 1.15 μ J (4) 9.1 μ J

MG0203

40. An arrangement of three parallel straight wires placed perpendicular to plane of paper carrying same current 'I along the same direction is shown in fig. Magnitude of force per unit length on the middle wire 'B' is given by :-



(1) $\dfrac{2\mu_0 i^2}{\pi d}$ (2) $\dfrac{\sqrt{2}\mu_0 i^2}{\pi d}$ (3) $\dfrac{\mu_0 i^2}{\sqrt{2}\pi d}$ (4) $\dfrac{\mu_0 i^2}{2\pi d}$

MG0204

NEET(UG) 2018

41. A thin diamagnetic rod is placed vertically between the poles of an electromagnet. When the current in the electromagnet is switched on, then the diamagnetic rod is pushed up, out of the horizontal magnetic field. Hence the rod gains gravitational potential energy. The work required to do this comes from

(1) the current source
(2) the magnetic field
(3) the lattice structure of the material of the rod
(4) the induced electric field due to the changing magnetic field

MG0213

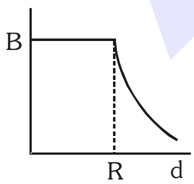
NEET(UG) 2019

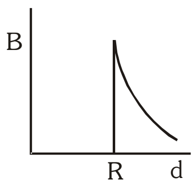
42. At a point A on the earth's surface the angle of dip, $\delta = +25°$. At a point B on the earth's surface the angle of dip, $\delta = -25°$. We can interpret that:

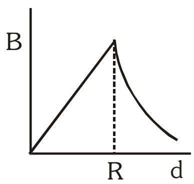
(1) A and B are both located in the northern hemisphere.
(2) A is located in the southern hemisphere and B is located in the northern hemisphere.
(3) A is located in the northern hemisphere and B is located in the southern hemisphere.
(4) A and B are both located in the southern hemisphere

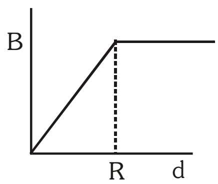
MG0333

43. A cylindrical conductor of radius R is carrying a constant current. The plot of the magnitude of the magnetic field, B with the distance d, from the centre of the conductor, is **correctly** represented by the figure :

(1)


(2)


(3)


(4)


MG0334

44. Ionized hydrogen atoms and α-particles with same momenta enters perpendicular to a constant magnetic field B. The ratio of their radii of their paths $r_H : r_\alpha$ will be

(1) 2 :1 (2) 1 : 2 (3) 4 : 1 (4) 1 : 4

MG0335

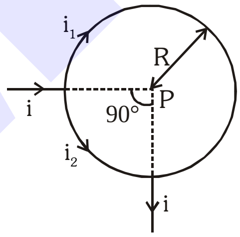
NEET(UG) 2019 (Odisha)

45. Two toroids 1 and 2 have total number of turns 200 and 100 respectively with average radii 40 cm and 20 cm respectively. If they carry same current i, then the ratio of the magnetic fields along the two is :

(1) 1 : 1 (2) 4 : 1 (3) 2 : 1 (4) 1 : 2

MG0336

46. A straight conductor carrying current i splits into two parts as shown in the figure. The radius of the circular loop is R. The total magnetic field at the centre P of the loop is :



(1) Zero
(2) $3\mu_0 i/32$ R, outward
(3) $3\mu_0 i/32R$, inward
(4) $\mu_0 i/2R$, inward

MG0337

NEET(UG) 2020

47. An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m^{-1}. The permeability of the material of the rod is :
($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})

(1) $2.4\pi \times 10^{-7}$ T m A^{-1}
(2) $2.4\pi \times 10^{-4}$ T m A^{-1}
(3) 8.0×10^{-5} T m A^{-1}
(4) $2.4\pi \times 10^{-5}$ T m A^{-1}

MG0338

48. A long solenoid of 50 cm length having 100 turns carries a current of 2.5 A. The magnetic field at the centre of the solenoid is :
($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})

(1) 3.14×10^{-5} T (2) 6.28×10^{-4} T
(3) 3.14×10^{-4} T (4) 6.28×10^{-5} T

MG0339

NEET(UG) 2020 (COVID-19)

49. A wire of length L metre carrying a current of I ampere is bent in the form of a circle. Its magnetic moment is,

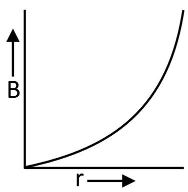
(1) I L^2/4 A m^2 (2) I π L^2 /4 A m^2

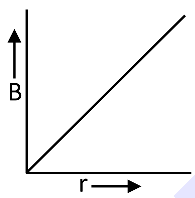
(3) 2 I L^2 /π A m^2 (4) I L^2 /4π A m^2

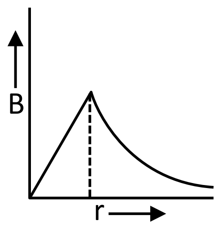
MG0340

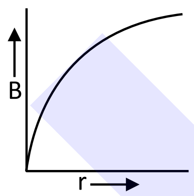
NEET(UG) 2021

50. A thick current carrying cable of radius 'R' carries current 'I' uniformly distributed across its cross-section. The variation of magnetic field B(r) due to the cable with the distance 'r' from the axis of the cable is represented by :

(1)


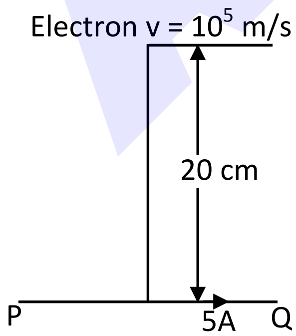
(2)


(3)


(4)


MG0341

51. An infinitely long straight conductor carries a current of 5 A as shown. An electron is moving with a speed of 10^5 m/s parallel to the conductor. The perpendicular distance between the electron and the conductor is 20 cm at an instant. Calculate the magnitude of the force experienced by the electron at that instant.



(1) 4×10^{-20} N (2) $8\pi \times 10^{-20}$ N
(3) $4\pi \times 10^{-20}$ N (4) 8×10^{-20} N

MG0342

52. In the product

$\vec{F} = q\left(\vec{\upsilon} \times \vec{B}\right)$

$= q\vec{\upsilon} \times \left(B\hat{i} + B\hat{j} + B_0\hat{k}\right)$

For q = 1 and $\vec{\upsilon} = 2\hat{i} + 4\hat{j} + 6\hat{k}$ and

$$\vec{F} = 4\hat{i} - 20\hat{j} + 12\hat{k}$$

What will be the complete expression for $\vec{B}$?

(1) $-8\hat{i} - 8\hat{j} - 6\hat{k}$ (2) $-6\hat{i} - 6\hat{j} - 8\hat{k}$

(3) $8\hat{i} + 8\hat{j} - 6\hat{k}$ (4) $6\hat{i} + 6\hat{j} - 8\hat{k}$

MG0343

53. A uniform conducting wire of length 12a and resistance 'R' is wound up as a current carrying coil in the shape of,

(i) an equilateral triangle of side 'a'.

(ii) a square of side 'a'.

The magnetic dipole moments of the coil in each case respectively are:

(1) $\sqrt{3}$ Ia^2 and 3 Ia^2 (2) 3 Ia^2 and Ia^2

(3) 3 Ia^2 and 4 Ia^2 (4) 4 Ia^2 and 3 Ia^2

MG0344

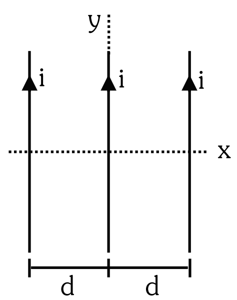
NEET (UG) 2021(Paper-2)

54. The magnetic susceptibility of any paramagnetic material changes with absolute temperature T is

(1) Directly proportional to T
(2) Remains constant
(3) Inversely proportional to T
(4) Exponentially decaying with T

MG0345

55. Three long parallel wires carrying same current i in the x-y plane, the middle wire is along y-axis as shown in the figure. Now the middle wire is displaced by distance z along z-axis, so the magnetic force per unit length acting on it is



(1) $\dfrac{\mu_0 i^2 z}{2\pi(d^2 + z^2)}$ (2) $\dfrac{\mu_0 i^2 z}{\pi(d^2 + z^2)}$

(3) $\dfrac{\mu_0 i^2}{2\pi(d^2 + z^2)^{1/2}}$ (4) $\dfrac{\mu_0 i^2}{\pi(d^2 + z^2)^{1/2}}$

MG0346

56. A long wire carrying a current I is bent at right angle. The magnitude of magnetic field at height d above the point of bending is

(1) $\frac{\mu_0 I}{2\pi d}$ (2) $\frac{\sqrt{2}\mu_0 I}{2\pi d}$

(3) $\frac{\mu_0 I}{2\sqrt{2}\pi d}$ (4) $\frac{\mu_0 I}{4\sqrt{2}\pi d}$

MG0347

NEET (UG) 2022

57. A long solenoid of radius 1 mm has 100 turns per mm. If 1A current flows in the solenoid, the magnetic field strength at the centre of the solenoid is

(1) 12.56×10^{-2} T (2) 12.56×10^{-4} T

(3) 6.28×10^{-4} T (4) 6.28×10^{-2} T

MG0348

58. Given blow are two statements:

Statement I :

Biot-Savart's law gives us the expression for the magnetic field strength of an infinitesimal current element(Idl) of a current carrying conductor only.

Statement II :

Biot-Savart's law is analogous to Coulomb's inverse square law of charge q, with the former being related to the field produced by a scalar source, Idl while the latter being produced by a vector source, q.

In light of above statement choose the most **appropriate** answer from the options given below:

(1) Both statement I and Statement II are incorrect

(2) Statement I is correct and Statement II is incorrect

(3) Statement I is incorrect and Statement II is correct

(4) Both statement I and Statement II are correct

MG0349

59. From Ampere's circuital law for a long straight wire of circular cross-section carrying a steady current, the variation of magnetic field in the inside and outside region of the wire is:

(1) a linearly increasing function of distance upto the boundary of the wire and then linearly decreasing for the outside region.

(2) a linearly increasing function of distance r upto the boundary of the wire and then decreasing one with 1/r dependence for the outside region.

(3) a linearly decreasing function of distance upto the boundary of the wire and then a linearly increasing one for the outside region.

(4) uniform and remains constant for both the regions.

MG0350

NEET (UG) 2022 (Overseas)

60. The ratio of the radii of two circular coils is 1 : 2. The ratio of currents in the respective coils such that the same magnetic moment is produced at the centre of each coil:

(1) 2 : 1 (2) 1 : 2

(3) 1 : 4 (4) 4 : 1

MG0351

61. A strong magnetic field is applied along the direction of velocity of an electron. The electron would move along:

(1) the original path (2) a helical path

(3) a circular path (4) a parabolic path

MG0352

62. Given below are two statements:

Statement-I: The magnetic field of circular current loop at very far away point on the axial line varies with distance as like that of a magnetic dipole.

Statement-II: The magnetic field due to magnetic dipole varies inversely with the square of the distance from the centre on the axial line.

In light of above statements, choose the most appropriate answer from the options given below:

(1) **Statement-I** is incorrect and **Statement-II** is correct.

(2) Both **Statement-I** and **Statement-II** are correct.

(3) Both **Statement-I** and **Statement-II** are incorrect.

(4) **Statement-I** is correct and **Statement-II** is incorrect.

MG0353

63. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A): Gauss's law for magnetism states that the net magnetic flux through any closed surface is zero.

Reason (R): The magnetic monopoles do not exist. North and South poles occur in pairs, allowing vanishing net magnetic flux through the surface.

In the light of the above statement, choose the most appropriate answer from the options given below:

(1) **(A)** is false but **(R)** is true

(2) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**

(3) Both **(A)** and **(R)** are true and **(R)** is not the correct explanation of **(A)**

(4) **(A)** is true but **(R)** is false

MG0354

Re-NEET (UG) 2022

64. A closely packed coil having 1000 turns has an average radius of 62.8 cm. If current carried by the wire of the coil is 1 A, the value of magnetic field produced at the centre of the coil will be (permeability of free space = $4\pi \times 10^{-7}$ H/m) nearly:

(1) 10^{-1} T (2) 10^{-2} T (3) 10^{2} T (4) 10^{-3} T

MG0355

65. The shape of the magnetic field lines due to an infinite long, straight current carrying conductor is :

(1) a straight line (2) circular

(3) elliptical (4) a plane

MG0356

66. Two very long, straight, parallel conductors A and B carry current of 5A and 10A respectively and are at a distance of 10 cm from each other. The direction of current in two conductors is same. The force acting per unit length between two conductors is:

($\mu_0 = 4\pi \times 10^{-7}$ SI unit)

(1) 2×10^{-4} Nm^{-1} and is attractive

(2) 2×10^{-4} Nm^{-1} and is repulsive

(3) 1×10^{-4} Nm^{-1} and is attractive

(4) 1×10^{-4} Nm^{-1} and is repulsive

MG0357

67. The magnetic field on the axis of a circular loop of radius 100 cm carrying current $I = \sqrt{2}A$, at point 1 m away from the centre of the loop is given by:

(1) 3.14×10^{-7} T

(2) 6.28×10^{-7} T

(3) 3.14×10^{-4} T

(4) 6.28×10^{-4} T

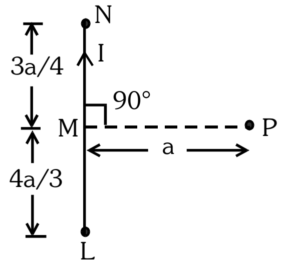
MG0358

EXERCISE-II (Previous Year Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**3**	**4**	**2**	**3**	**3**	**2**	**1**	**4**	**2**	**3**	**1**	**4**	**2**	**2**	**4**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**1**	**3**	**2**	**2**	**1**	**1**	**1**	**4**	**1**	**3**	**3**	**4**	**3**	**2**	**3**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	**1**	**1**	**1**	**3**	**4**	**4**	**3**	**4**	**4**	**3**	**1**	**3**	**3**	**1**	**1**
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	**1**	**2**	**2**	**4**	**3**	**4**	**2**	**1**	**3**	**2**	**3**	**1**	**2**	**2**	**4**
Que.	61	62	63	64	65	66	67								
Ans.	**1**	**4**	**2**	**4**	**2**	**3**	**1**								

EXERCISE-III (Analytical Questions) — Master Your Understanding

1. Magnetic field at point 'P' due to finite length wire LN, (where I in ampere and a in meter) is :

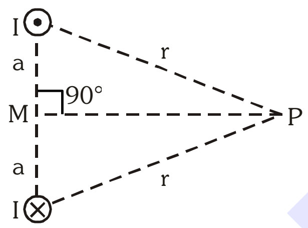


(1) $\frac{7\mu_0 I}{10\pi a}$ (2) $\frac{14\mu_0 I}{5\pi a}$

(3) $\frac{7\mu_0 I}{20\pi a}$ (4) $\frac{70\mu_0 I}{2\pi a}$

MG0223

2. Magnetic field at point 'P' due to following current distribution is :-



(1) $\frac{\mu_0 I}{\pi r^2}\sqrt{r^2 - a^2}$ (2) $\frac{\mu_0 Ia}{\pi r^2}$

(3) $\frac{\mu_0 I}{2\pi r^2}\sqrt{r^2 - a^2}$ (4) $\frac{\mu_0 Ia}{2\pi r^2}$

MG0224

3. A long horizontal wire 'A' is rigidly fixed and an another wire 'B' which is placed directly below and parallel to wire 'A'. Wire 'B' remains suspended in air due to magnetic attraction. If direction of current is reversed in any one wire then instantaneous acceleration of free wire 'B' (where g is acceleration due to gravity)

(1) g, in downward direction

(2) g, in upward direction

(3) 2g, in downward direction

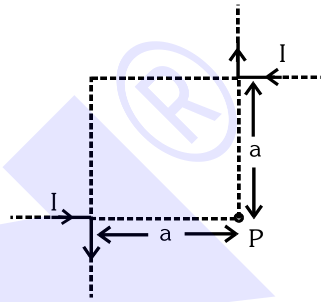
(4) 2g, in upward direction

MG0226

4. A dip circle is taken to geomagnetic equator. The needle is allowed to move in a vertical plane perpendicular to the magnetic meridian. The needle will stay
(1) in horizontal direction only
(2) in vertical direction only
(3) in any direction except vertical and horizontal
(4) in any direction it is released

MG0227

5. Magnetic field at point 'P' due to given current distribution :-



(1) $\frac{\mu_0 I}{4\pi a} \odot$ (2) $\frac{\mu_0 I}{2\pi a} \odot$

(3) $\frac{\mu_0 I}{\pi a} \otimes$ (4) Zero

MG0228

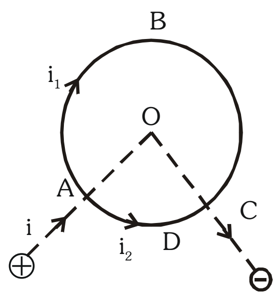
6. At very close point on the axis of a current carrying circular coil (x<<<R) of radius 'R', the value of magnetic field decreses by a fraction of 5% with respect to centre value. The position of the point from the centre of the coil is :-

(1) $\frac{R}{\sqrt{10}}$ (2) $\frac{R}{\sqrt{30}}$

(3) $\frac{R}{\sqrt{50}}$ (4) $\frac{R}{\sqrt{150}}$

MG0229

7. A circular conducting loop is connected by a battery according to figure. The length of ABC and ADC is ℓ_1 and ℓ_2 respectively then which is correct :-

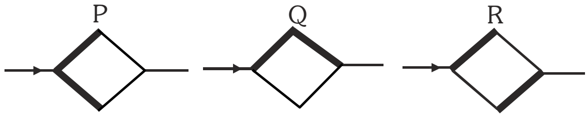


(1) $i_1/\ell_1 = i_2/\ell_2$ (2) $\frac{\ell_1^2}{i_1^2} = \frac{\ell_2^2}{i_2^2}$

(3) $i_1\ell_1 = i_2\ell_2$ (4) $i_1 i_2 = \ell_1\ell_2$

MG0230

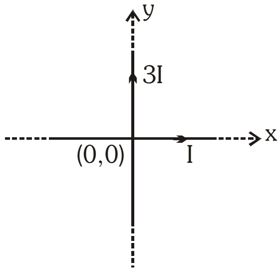
8. Two thick wires and two thin wires, all of the same materials and same length form a square in the three different ways P, Q and R as shown in figure with current connection shown. The magnetic field at the centre of the square is zero in cases:-



(1) in P only (2) in P and Q only
(3) in Q and R only (4) P and R only

MG0231

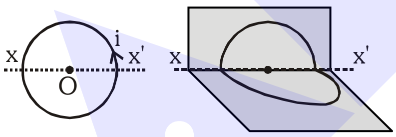
9. The equation of line on which magnetic field is zero due to system of two perpendicular infinetely long current carrying straight wires, is :-



(1) x = y (2) x = 2y
(3) x = 3y (4) 3x = y

MG0232

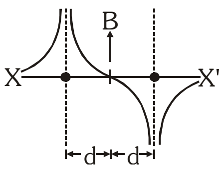
10. In the given figure magnetic field at the centre of ring (O) is $8\sqrt{2}$ T. Now it is turned through 90° about XX' axis, so that two semicircular parts are mutually perpendicular. Then find the value of magnetic field (in Tesla) at centre :-

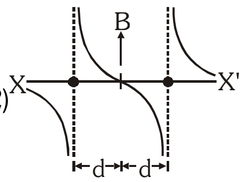


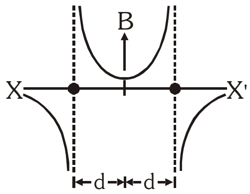
(1) 8 (2) $8\sqrt{2}$
(3) 4 (4) $8/\sqrt{2}$

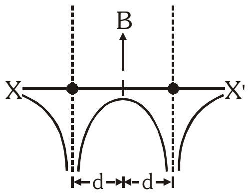
MG0233

11. Two long parallel wires are at a distance 2d apart. They carry steady equal currents flowing out of the plane of the paper, as shown in figure. The variation of the magnetic field B along the line XX' is given by :-

(1) 

(2) 

(3) 

(4) 

MG0234

12. A current i flows along the length of an infinite long, straight, thin walled pipe, then:-

(1) the magnetic field at all points inside the pipe is same but not zero.

(2) the magnetic field at any point inside the pipe is zero.

(3) the magnetic field is zero only on the axis of the pipe.

(4) the magnetic field is different at different points inside the pipe.

MG0235

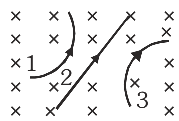
13. A steady electric current is flowing through a cylindrical wire :-

(a) the electric field at the axis of wire is zero
(b) the magnetic field at the axis of wire is zero
(c) the electric field in the vicinity of wire is Zero.
(d) the magnetic field in the vicinity of wire is Zero.

(1) a,b,c (2) b,c (3) only c (4) only b

MG0236

14. The charges 1, 2, 3 are moving in uniform transverse magnetic field then :-



(1) particle '1' positive and particle 3 negative
(2) particle 1 negative and particle 3 positive
(3) particle 1 negative and particle 2 neutral
(4) particle 1 and 3 are positive and particle 2 neutral

MG0237

15. H^+, He^+ and O^{++} all having the same kinetic energy pass through a region with is a uniform magnetic field perpendicular to their velocity. The masses of H^+, He^+ and O^{++} are 1 amu, 4 amu and 16 amu respectively then :-

(a) H^+ will be deflected most
(b) O^{++} will be deflected most
(c) He^+ and O^{++} will be deflected equally
(d) all will be deflected equally

(1) a, b (2) a, b, c (3) only a (4) a, c

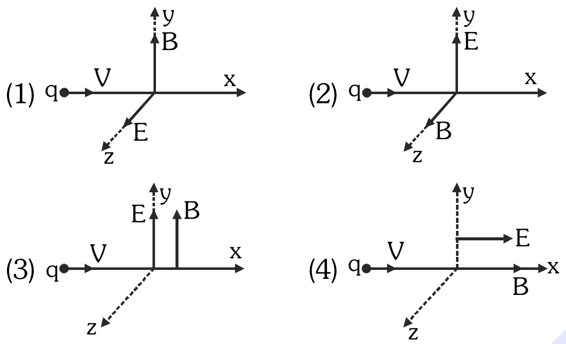
MG0238

16. A particle of mass 0.5 gm and charge 2.5×10^{-8} C is moving with velocity 6×10^4 m/s. What should be the minimum value of magnetic field acting on it, so that the particle is able to move in a straight line? (g = 9.8 m/sec^2)

(1) 0.327 Weber/m^2 (2) 3.27 Weber/m^2
(3) 32.7 Weber/m^2 (4) none of these

MG0239

17. A particle of charge q and mass m is moving along the x-axis with a velocity v and enters a region of electric field E and magnetic field B as shown in figure below. For which figure the net force on the charge may be zero :-



MG0240

18. In a mass spectrograph, mass number and charge of ion A are 24 and +2e respectively. Mass number and charge of ion B are 22 and +e. If both ions have same speed and the radius of path traced by ion A is 24 cm then radius of path traced by ion B will be :-

(1) 55 cm (2) 11 cm (3) 44 cm (4) 24 cm

MG0241

19. A charged particle moves through a magnetic field perpendicular to its direction, then : -

(1) both momentum and kinetic energy of the particle are not constant
(2) both momentum and kinetic energy of the particle are constant
(3) kinetic energy changes but the momentum is constant
(4) the momentum changes but the kinetic energy is constant

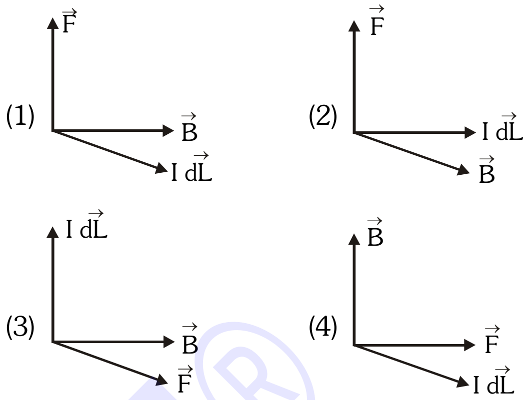
MG0242

20. A beam of electrons moving along +y direction enters in a region of uniform electric and magnetic fields. If the beam goes undeflected through this region then field (B) and (E) are directed respectively:-

(1) –x axis and +z axis (2) +z axis and –x axis
(3) +x axis and –z axis (4) –x axis and –y axis

MG0243

21. In accordance with Ampere's law of force the direction of force $\vec{F}$, magnetic induction $\vec{B}$ and current element $I\,d\vec{L}$ are best represented by :-



MG0245

22. A coil in the shape of equilateral triangle of side 0.02 m is suspended from the vertex such that it is hanging in a vertical plane between the pole-pieces of a permanent magnet producing a horizontal magnetic field of 5×10^{-2} T. When a current of 0.1 A passes through it and the magnetic field is parallel to its plane then couple acting on the coil is :-

(1) 8.65×10^{-7} N-m
(2) 6.65×10^{-7} N-m
(3) 3.35×10^{-7} N-m
(4) 3.91×10^{-7} N-m

MG0246

23. A solenoid of length 0.4 m, having 500 turns and 3A current flows through it. A coil of radius 0.01 m and have 10 turns and carries current of 0.4 A has to placed such that its axis is perpendicular to the axis of solenoid, then torque on coil will be:-

(1) 5.92×10^{-6} N.m
(2) 5.92×10^{-5} N.m
(3) 5.92×10^{-4} N.m
(4) 0.592×10^{-3} N.m

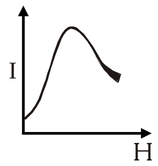
MG0247

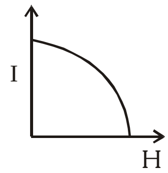
24. The value of magnetic susceptibility for super–conductors is :-

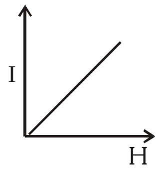
(1) Zero (2) Infinity
(3) +1 (4) –1

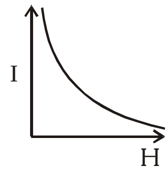
MG0249

25. The correct I–H curve for paramagnetic materials is :-

(1) 

(2) 

(3) 

(4) 

MG0250

26. The magnetic susceptibility of a paramagnetic substance is 3×10^{-4}. It is placed in a magnetising field of 4×10^4 A/m. The intensity of magnetisation will be:-

(1) 3×10^8 A/m
(2) 12×10^8 A/m
(3) 12 A/m
(4) 24 A/m

MG0252

27. The volume susceptibility of a magnetic material is 30×10^{-4}. Its relative permeability will be :-

(1) 31×10^{-4}
(2) 1.003
(3) 1.0003
(4) 29×10^{-4}

MG0253

28. The magnetic moment of a magnet of mass 75 gm is 9×10^{-7} A-m^2. If the density of the material of magnet is 7.5×10^3 kg/m^3 then intensity of magnetisation will be :-

(1) 0.9 A/m
(2) 0.09 A/m
(3) 9 A/m
(4) 90 A/m

MG0254

29. The area of hysteresis loop of a material is equivalent to 250 Joule/m^3. When 10 kg material is magnetised by an alternating field of 50Hz then energy lost in one hour will be if the density of material is 7.5 gm/cm^3.

(1) 6×10^4 Joule
(2) 6×10^4 Erg
(3) 3×10^2 Joule
(4) 3×10^2 Erg

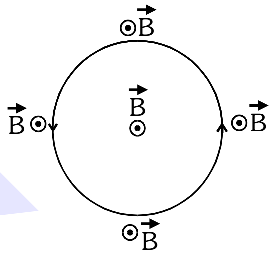
MG0255

30. The coercivity of a bar magnet is 100A/m. It is to be demagnetised by placing it inside a solenoid of length 100 cm and number of turns 50. The current flowing the solenoid will be :-

(1) 4A
(2) 2A
(3) 1A
(4) zero

MG0256

31. An elastic circular wire of length ℓ carries a current I_0. It is placed in a uniform magnetic field $\vec{B}$ (out of paper) such that its plane is perpendicular to the direction of $\vec{B}$. The wire will experiences :-



(1) No force
(2) A stretching force
(3) A compressive force
(4) A torque

MG0257

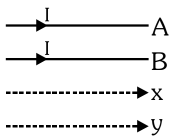
32. Which of the following conclusions can be drawn from the result ?

$\oint \vec{B}.d\vec{A} = 0$

(1) magnetic field is zero everywhere
(2) magnetic monopole cannot exist
(3) magnetic lines of forces do not intersect each
(4) a current produces magnetic field

MG0258

33. A and B are two wires carrying a current I in the same direction. x and y are two electron beams moving in the same direction. There will be :-



(1) Attraction between A and B, repulsion between x and y
(2) Repulsion between A and B, attraction between x and y
(3) Attraction between A and B & x and y
(4) Repulsion between A and B & x and y

MG0259

34. In a mass spectrograph O^{++}, C^{+}, He^{++} and H^{+} are projected on a photographic plate with same velocity in uniform magnetic field then which will strike the plate farthest :-

(1) O^{++} (2) C^{+}

(3) He^{++} (4) H^{+}

MG0261

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

(1) Positive ions deflect towards +y direction and negative ions towards - y direction

(2) All ions deflect towards + y direction

(3) All ions deflect towards - y direction

(4) Positive ions deflect towards - y direction and negative ions towards +y direction

MG0262

36. A proton of mass 1.67×10^{-27} kg and charge 1.6×10^{-19}C is projected with a speed of 2×10^{6} ms^{-1} at an angle of 60° to the X-axis. If a uniform magnetic field of 0.104 tesla is applied along Y-axis, the path of proton is :-

(1) A circle of radius = 0.2 m and time period = $2\pi \times 10^{-7}$ s

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

(3) A helix of radius = 0.1 m and time period = $2\pi \times 10^{-7}$ s

(4) A helix of radius = 0.2 m and time period = $2\pi \times 10^{-7}$ s

MG0263

37. A straight wire 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 (consider earth field) :-

(1) Greater than at Q

(2) Same as at Q

(3) Less than at Q

(4) Greater or less than at Q, depending upon the strength of current

MG0264

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

(1) 28 Hz (2) 280 MHz

(3) 2.8 GHz (4) 28 GHz

MG0266

39. Two concentric coils each of radius equal to 2π cm. are placed at right angles to each other. The currents 3 A and 4 A are flowing in each coil respectively. The magnetic induction in weber/m^2 at the centre of the coils will be :-

(1) 7×10^{-5} (2) 5×10^{-5}

(3) 10^{-5} (4) 12×10^{-5}

MG0267

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

(1) $\sqrt{\frac{v}{B}}$ (2) $\frac{v}{B}$

(3) $\frac{B}{v}$ (4) $\sqrt{\frac{B}{v}}$

MG0269

41. A loop in the shape of an equilateral triangle of side ℓ is suspended between the pole pieces of a permanent magnet such that is in plane of the loop. If due to a current i in the triangle a torque τ acts on it, the side ℓ of the triangle is :-

(1) $\frac{2}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)$ (2) $\frac{1}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)$

(3) $2\left(\frac{\tau}{\sqrt{3}Bi}\right)^{\frac{1}{2}}$ (4) $\frac{2}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)^{\frac{1}{2}}$

MG0270

42. Two circular loop 1 and 2 are made by the same copper wire but the radius of the 1st loop is twice that of the 2nd loop, what is ratio of potential difference applied across the loops. If the magnetic field produced at their centres is equal :-

(1) 3 (2) 4

(3) 6 (4) 2

MG0271

43. A current I flows along the length of an infinitely long, straight, thin walled pipe, then :-

(1) the magnetic field is different at different points inside the pipe

(2) the magnetic field at any point inside the pipe is zero

(3) the magnetic field at all points inside the pipe is the same, but not zero

(4) the magnetic field is zero only on the axis of the pipe

MG0273

44. A closely wound solenoid 80 cm long has 5 layers of winding of 400 turns each. The diameter of the solenoid is 1.8 cm. If the current carried is 8.0 A, the magnitude of $\vec{B}$ inside the solenoid near its centre will be

(1) $8\pi \times 10^{-3}$ T

(2) $6\pi \times 10^{-3}$ T

(3) $4\pi \times 10^{-3}$ T

(4) $3\pi \times 10^{-3}$ T

MG0274

45. The magnetic field in a certain region of space is given by $\vec{B} = 8.35 \times 10^{-2}\,\hat{i}$ T. A proton is shot into the field with velocity $\vec{v} = (2 \times 10^5\,\hat{i} + 4 \times 10^5\,\hat{j})$ m/s. The proton follows a helical path in the field. The distance moved by proton in the x-direction during the period of one revolution in the yz-plane will be

(1) 0.053 m

(2) 0.136 m

(3) 0.157 m

(4) 0.236 m

(Mass of proton = 1.67×10^{-27} kg)

MG0275

46. A circular coil placed in a uniform magnetic field. If alternating current flows through this coil then :-

(1) net force will act on coil

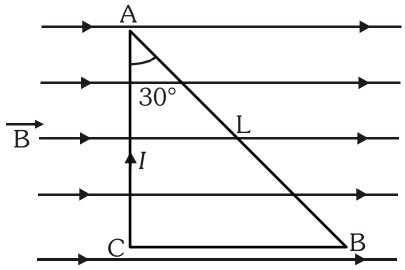
(2) coil will be stationary

(3) coil will be rotated

(4) coil will move on straight line

MG0276

47. Consider the inferences given below in respect of the following current loop of wire kept in a magnetic field $\vec{B}$.



A. The magnitude and direction of force on the element AC of the wire is $\frac{\sqrt{3}}{2}$ILB directed into the page.

B. The magnitude and direction of force on the element AB of the wire is $\frac{\sqrt{3}}{2}$ILB directed into the page.

C. The total force on the loop ABCA is zero.

Which of the above is /are not true ?

(1) A and B
(2) B only
(3) A and C only
(4) B and C

MG0277

48. A planar coil having 12 turns carries 15 A current. The coil is oriented with respect to the uniform magnetic field $\vec{B} = 0.2\hat{i}$ T such that its directed area is $\vec{A} = -0.04\hat{i}\text{m}^2$. The potential energy of the coil in the given orientation is

(1) 0
(2) + 0. 72
(3) +1.44 J
(4) –1.44 J

MG0278

49. Which of the following is true :-

(1) Diamagnetism is temperature dependent

(2) Paramagnetism is temperature dependent

(3) Paramagnetism is temperature independent

(4) None of these

MG0279

50. A superconductor exhibits perfect :-

(1) Ferrimagnetism

(2) Antierromagnetism

(3) Paramagnetism

(4) Diamagnetism

MG0280

51. Which of the following statements is incorrect about hystersis :-
(1) This effect is common to all ferrromagnetic substances
(2) The hysteresis loop area is proportional to the thermal energy developed per unit volume of the material
(3) The hysteresis loop area is independent of the thermal energy developed per unit volume of the material
(4) The shape of the hysteresis loop is characterstic of the material
MG0281

52. A frog can be levitated in a magnetic field produced by a current in a vertical solenoid placed below the frog. This is possible because the body of the frog behaves as :-
(1) paramagnetic. (2) diamagnetic
(3) ferromagnetic (4) antiferromagnetic
MG0282

53. Liquid oxygen remains suspended between two pole faces of a magnet because it is :-
(1) diamagnetic (2) paramagnetic
(3) ferromagnetic (4) antiferromagnetic
MG0283

54. When a piece of a ferromagnetic substance is put in a uniform magnetic field. Flux density inside it is four times the flux density away from the piece. The magnetic permeability of the material is :
(1) 1 (2) 2 (3) 3 (4) 4
MG0284

55. If the magnetic dipole moment of an atom of diamagnetic material, paramagnetic material and ferromagnetic material are denoted by μ_d, μ_p and μ_f respectively, then :-
(1) $\mu_p = 0$ and $\mu_f \neq 0$ (2) $\mu_d \neq 0$ and $\mu_p = 0$
(3) $\mu_d \neq 0$ and $\mu_f \neq 0$ (4) $\mu_d = 0$ and $\mu_p \neq 0$
MG0285

56. Among the following properties describing diamagnetism identify the property that is wrongly stated :-
(1) Diamagnetic material do not have permanent magnetic moment
(2) Diamagnetism is explained by orbital motion of electron
(3) Diamagnetic materials have a small positive susceptibility
(4) The magnetic moment of individual electrons neutralize each other.
MG0286

57. Correct relation between magnetic field B, Magnetic intensity H and magnetism M is :-
(1) $B = \mu_0(H + M)$ (2) $M = \mu_0(B + H)$
(3) $H = \mu_0(B + M)$ (4) $B = 2H(1 + M)$
MG0287

58. Relative perimittivity and permeability of a material are ε_r and μ_r respectively. Which of the following values of these quantities are allowed for a diamagnetic material :-
(1) $\varepsilon_r = 0.5, \mu_r = 1.5$ (2) $\varepsilon_r = 1.5, \mu_r = 0.5$
(3) $\varepsilon_r = 0.5, \mu_r = 0.5$ (4) $\varepsilon_r = 1.5, \mu_r = 1.5$
MG0288

59. Two particles each of mass m and charge q, are attached to the two ends of a light rigid rod of length 2l. The rod is rotated at constant angular speed about a perpendicular axis passing through its centre. The ratio of the magnitudes of the magnetic moment of the system and its angular momentum about the centre of the rod is :-
(1) $\frac{q}{\pi m}$ (2) $\frac{q}{m}$ (3) $\frac{2q}{m}$ (4) $\frac{q}{2m}$
MG0290

EXERCISE-III (Analytical Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	3	2	3	4	2	2	3	4	3	1	2	2	2	1	4
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	2	2	3	4	2	1	1	1	4	3	3	2	2	1	2
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	2	2	1	2	3	3	1	4	2	1	3	2	2	1	3
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	
Ans.	2	2	3	2	4	3	2	2	4	4	3	1	2	4	