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°

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

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 $R^2/2$

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

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

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

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

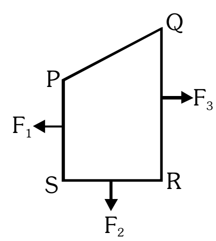
8. A closed loop PQRS carrying a current is placed in a uniform magnetic field. If the magnetic forces on segments PS, SR and RQ are F_1, F_2 and F_3 respectively and are in the plane of the paper and along the directions shown, the force on the segment QP is :-

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



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

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) $-3\vec{F}$

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) $\frac{\mu_0 q}{2fR}$

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) $\frac{\mu_0 i}{2\sqrt{2}R}$

13. A closely wound solenoid of 2000 turns and area of cross-section $1.5\times 10^{-4}\ m^2$ 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

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)

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

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

AIPMT (Mains) 2010

17. The magnetic moment of a diamagnetic atom is :-

(1) 1

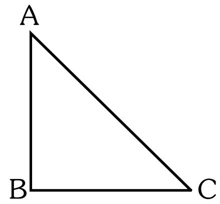
(2) Between zero and one

(3) Equal to zero

(4) Much greater than one

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) $\sqrt{2}\vec{F}$

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

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

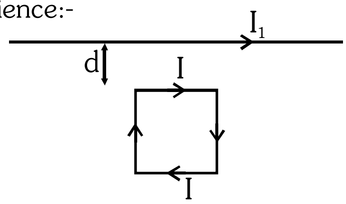
(2) C is of a diamagnetic material

(3) D is of a ferromagnetic material

(4) A is of a non-magnetic material

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

AIPMT (Pre) 2012

22. An alternating electric field, of frequency ν, is applied across the dees (redius = 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 $K = m^2\pi\nu R^2$

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

NEET-UG 2013

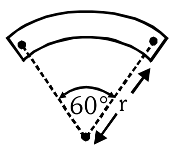
24. A current loop in a magnetic field :-

(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

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

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) $\frac{2}{\pi}M$

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 :-

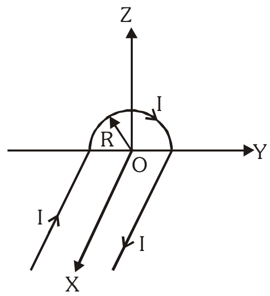
(1) $\frac{\mu_0}{2\pi d}\left(\frac{I_1}{I_2}\right)$ (2) $\frac{\mu_0}{2\pi d}(I_1+I_2)$
(3) $\frac{\mu_0}{2\pi d}(I_1^2-I_2^2)$ (4) $\frac{\mu_0}{2\pi d}(I_1^2+I_2^2)^{1/2}$

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) $\frac{\mu_0 ne}{2\pi r}$

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

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

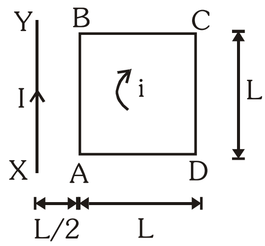
31. A proton and an alpha particle both enter a region of uniform magnetic field, B, moving at right angles to the field B. If the radius of circular orbits for both the particles is equal and the kinetic energy acquired by proton is 1 MeV, the energy acquired by the alpha particle will be :-

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

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



33. The magnetic susceptibility is negative for :

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

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 $\frac{a}{2}$ and 2a respectively, from the axis of the wire is :

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

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

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

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

NEET(UG) 2017

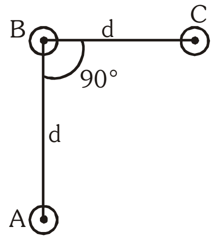
38. If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then the true angle of dip θ is given by :-

(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) $\cot^2\theta = \cot^2\theta_1 + \cot^2\theta_2$

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

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

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

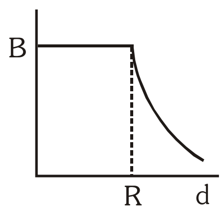
(1) the current source
(2) the magnetic field
(3) the lattice structure of the material of the rod
(4) the induced electric field due to the changing magnetic field

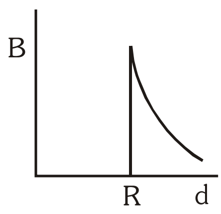
NEET(UG) 2019

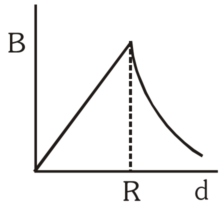
42. At a point A on the earth's surface the angle of dip, $\delta = +25°$. At a point B on the earth's surface the angle of dip, $\delta = -25°$. We can interpret that :

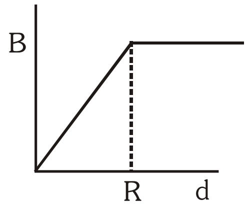
(1) A and B are both located in the northern hemisphere.
(2) A is located in the southern hemisphere and B is located in the northern hemisphere.
(3) A is located in the northern hemisphere and B is located in the southern hemisphere.
(4) A and B are both located in the southern hemisphere

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)


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

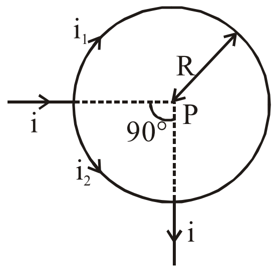
(1) 2 :1 (2) 1 : 2
(3) 4 : 1 (4) 1 : 4

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

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

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														
Ans.	**1**														