## Exercise–1 (Conceptual Questions)

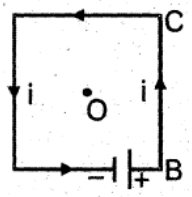
**Magnetic Field & Biot–Savart Law**

**1.** A stationary magnet does not interact with :–

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

**Ans.** **(4)**

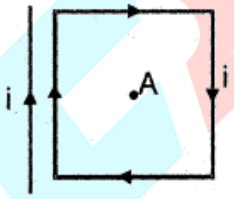
**2.** Following is square shape loop, whose one arm BC produces magnetic field B at the centre of coil. The resultant magnetic field due to all the arms will be :–




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

**Ans.** **(2)**

**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

**Ans.** **(2)**

**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

**Ans.** **(2)**

**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

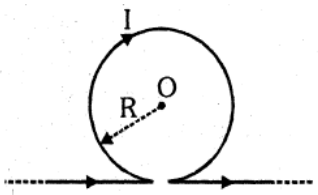
**Ans.** **(4)**

**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

**Ans.** **(1)**

**7.** Magnetic field at point O will be :–




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

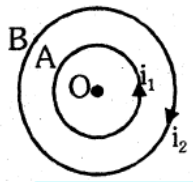
**Ans. (3)**

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

(1) $\vec{dB}=\frac{\mu_0}{4\pi}\frac{i\vec{dl}\sin\phi}{r^2}$ (2) $\vec{dB}=\frac{\mu_0}{4\pi}\frac{i\vec{dl}\times\hat{r}}{r^2}$ (3) $\vec{dB}=\frac{\mu_0}{4\pi}\frac{i\vec{dl}\times\hat{r}}{r^3}$ (4) $\vec{dB}=\frac{\mu_0}{4\pi}\frac{i\vec{dl}\times\vec{r}}{r^2}$

**Ans. (2)**

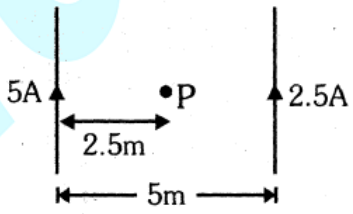
**9.** A and B are two concentric circular loop carrying current $i_1$ and $i_2$ as shown in figure. If ratio of their radii is 1 : 2 and ratio of the flux densities at the centre O due to A and B is 1 : 3 then the value of $\frac{i_1}{i_2}$ will be :–




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

**Ans. (4)**

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




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

**Ans. (3)**

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

(1) $2\times10^{-3}$ T (2) $\frac{2}{10}$T (3) $2\times10^{-7}$ T (4) $2\pi\times10^{-6}$ T

**Ans. (3)**

**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
**Ans. (4)**

**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 magnitude flux density at the centre of the coil :–
(1) $1.679 \times 10^{-5}$ T (2) $2.028 \times 10^{-4}$ T (3) $1.257 \times 10^{-3}$ T (4) $1.512 \times 10^{-6}$ T
**Ans. (3)**

**14.** $\pi$ 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
**Ans. (1)**

**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) $\frac{1}{4}$
**Ans. (3)**

**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
**Ans. (1)**

**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
**Ans. (4)**

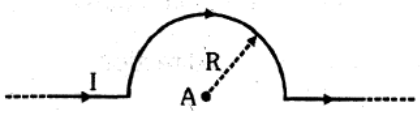
**18.** A circular coil of radius R carries an electric current. The magnetic field due the coil at a point on the axis of the coil located at a distance r from the center of the coil, such that r >> R varies as :–
(1) 1/r (2) $1/r^{3/2}$ (3) $1/r^2$ (4) $1/r^3$
**Ans. (4)**

**19.** Two concentric circular loops of radii 0.08m and 0.01m 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

**Ans. (1)**

**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

**Ans. (2)**

**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

**Ans. (4)**

**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) $\mu_0$ (4) $\frac{\mu_0}{2\pi}$

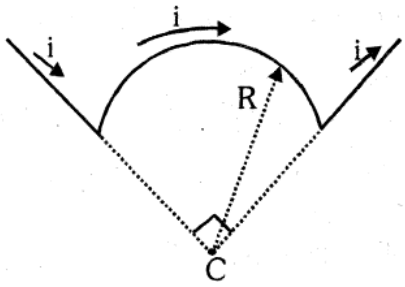
**Ans. (3)**

**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) $2.5 \times 10^{-7}$ T, southward (2) $5 \times 10^{-6}$ T, northward
(3) $5 \times 10^{-6}$ T, southward (4) $2.5 \times 10^{-7}$ T, northward

**Ans. (3)**

**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) $\left|\vec{B}\right| = \frac{\mu_0 i}{8R}$ into the plane of the figure

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

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

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

**Ans. (1)**

**AMPERE'S LAW**

**25.** For the hollow 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

**Ans. (3)**

**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 fo cross section of the solenoid
(4) all of the above

**Ans. (3)**

**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

**Ans. (2)**

**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

**Ans. (4)**

**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) $10^{-7}$

**Ans. (3)**

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

**Ans. (4)**

**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

**Ans.** **(3)**

**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

**Ans.** **(2)**

**33.** A long solenoid having 200 turns/cm and carries current i. Magnetic field at its axis is $6.28 \times 10^{-2}$ wb/m$^2$. An another solenoid having 100 turns/cm and carries $\frac{i}{3}$ current, then magnetic field at its axis will be :–

(1) $1.05 \times 10^{-4}$ Wb/m$^2$ (2) $1.05 \times 10^{-2}$ Wb/m$^2$
(3) $1.05 \times 10^{-5}$ Wb/m$^2$ (4) $1.05 \times 10^{-3}$ Wb/m$^2$

**Ans.** **(2)**

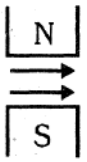
## MAGNETIC FORCE & MOVING CHARGE IN MAGNETIC FIELD

**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 $\left(\frac{P_\rho}{P_\alpha}\right)$ is :–

(1) 1 (2) 1/2 (3) 2 (4) ¼

**Ans.** **(2)**

**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

**Ans.** **(4)**

**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

**Ans. (3)**

**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) $Li^{++}$

**Ans. (4)**

**38.** When $\alpha$ and $\beta$ 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 $\alpha$ particles

(3) more for $\beta$ particles (4) none

**Ans. (3)**

**39.** If an electron of velocity $(2\hat{i}+3\hat{j})$ is subjected to magnetic field of $4\hat{k}$, then its :–

(a) path will change (b) speed does not change

(c) path must be circular (d) momentum is constant

(1) a, b (2) All (3) a, b, c (4) none

**Ans. (3)**

**40.** Two identically charged particles A and B initially at rest, are accelerated by a common potential difference V. They enters into a uniform transverse magnitude 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) $\left(\frac{r_2}{r_1}\right)$

**Ans. (1)**

**41.** An $\alpha$–particle experiences a force of $3.84 \times 10^{-14}$ N when its moves perpendicular to magnetic field of 0.2 Wb/$m^2$ then speed of the $\alpha$–particle is :–

(1) $6.0 \times 10^5$ m/sec (2) $5.0 \times 10^5$ m/sec (3) $1.2 \times 10^6$ m/sec (4) $3.8 \times 10^6$ m/sec

**Ans. (1)**

**42.** 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

**Ans. (4)**

**43.** A charge having q/m equal to $10^8$ C/kg and with velocity $3 \times 10^5$ m/s enters into a uniform magnetic field B = 0.3 tesla an angle 30° with direction of field. Then radius will be :–

(1) 0.01 cm (2) 0.5 cm (3) 1 cm (4) 2 cm

**Ans. (2)**

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

**45.** 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) $\left(\frac{r_2}{r_1}\right)$
**Ans.** **(3)**

**46.** An electron having mass 'm' and kinetic energy K 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) $\frac{2m}{eBE}$
**Ans.** **(3)**

**47.** 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) $\frac{24}{11}$
**Ans.** **(4)**

**48.** 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
**Ans.** **(4)**

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

**50.** 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) $\frac{vr}{B}$
**Ans.** **(1)**

**51.** 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

**Ans.** **(1)**

**52.** 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

**Ans.** **(1)**

**53.** 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

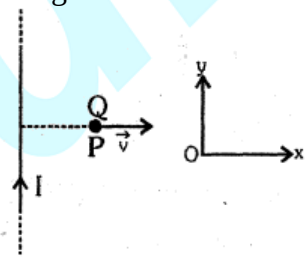
**Ans.** **(3)**

**54.** 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

**Ans.** **(1)**

**55.** 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

**Ans.** **(3)**

## LORENTZ FORCE &B MOTION OF CHARGED PARTICLE IN B

**56.** 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) $\frac{E^2}{B^2}$

**Ans.** **(1)**

**57.** Cyclotron is used to accelerate :–
(1) electrons (2) neutrons (3) positive ions (4) negative ions
**Ans.** **(3)**

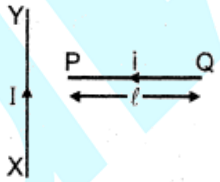
**58.** A charge 'q' moves in a region where electric field and magnetic field both exist, then force on it :–
(1) $q(\vec{v}\times\vec{B})$ (2) $q\vec{E}+q(\vec{v}\times\vec{B})$ (3) $q\vec{E}+q(\vec{B}\times\vec{v})$ (4) $q\vec{B}+q(\vec{E}\times\vec{v})$
**Ans.** **(2)**

**59.** 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 the parallel but perpendicular to v
**Ans.** **(3)**

**60.** 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
**Ans.** **(3)**

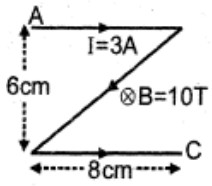
## FORCE ON A CURRENT CARRYING CONDUCTOR

**61.** 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
**Ans.** **(4)**

**62.** A current carrying wire AC is placed in uniform transverse magnitude field then the force on wire AC :–



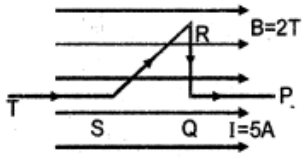

(1) 3N (2) 4.2 N (3) 6N (4) 4N
**Ans.** **(1)**

**63.** 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

**Ans. (1)**

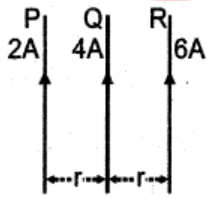
**64.** A wire PQRST carrying current I = 5A is placed in uniform magnetic field B = 2T as shown in figure. If the length of part QR = 4 cm and SR = 6 cm then the magnetic force on SR edge of the wire is :–




(1) 0.4 N (2) 0.6 N (3) zero (4) 6 N

**Ans. (1)**

**65.** P, Q and R long parallel straight wires in air, carrying currents as shown. The directionof 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

**Ans. (1)**

**66.** Two parallel wires in free spece 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) $2 \times 10^{-4}$ N, attractive (2) $2 \times 10^{-4}$ N, repulsive
(3) $2 \times 10^{-7}$ N, attractive (4) $2 \times 10^{-7}$ N, repulsive

**Ans. (1)**

**67.** Wire in the form of a right angle ABC, with AB = 3 cm 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) 1.5 N (2) 2.0N (3) 2.5N (4) 3.5N

**Ans. (3)**

**68.** When alternating current passes through a spring then it :–

(1) Contracts (2) Expands (3) Oscillates (4) Unchange

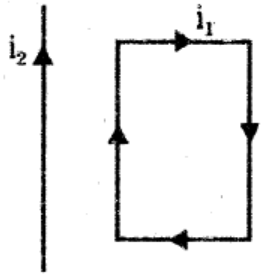
**Ans. (3)**

**69.** When direct current passed through a spring then it :–

(1) Contracts (2) Expands (3) Vibrate (4) Unchanged

**Ans. (1)**

**70.** 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

**Ans. (2)**

**71.** 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

**Ans. (1)**

**72.** 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

**Ans. (1)**

## CURRENT LOOP & MOVING COIL GALVANOMETER

**73.** 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 magnetic 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) $2\pi\ BR^2/\mu_0$

**Ans. (2)**

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

**Ans. (4)**

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

**Ans. (3)**

**76.** 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) $\frac{ni}{\sqrt{A}}$

**Ans. (1)**

**77.** 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) $10 \times 10^{16}$ rad/sec

(3) $\frac{5}{2\pi} \times 10^{16}$ rad/sec (4) $\frac{5}{4\pi} \times 10^{16}$ rad/sec

**Ans. (2)**

**78.** 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) $2\pi$IRB (3) Zero (4) $\pi$IRB

**Ans. (3)**

**79.** The unit of magnetic moment will be :–

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

**Ans. (2)**

**80.** 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) $\frac{A^2}{M}$

**Ans. (1)**

**81.** An electron revolves with frequency $6.6 \times 10^{15}$ 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

**Ans. (3)**

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

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

**Ans. (1)**

**83.** The magnetic moment ($\mu$) 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) $\mu \propto 1/n^2$

**Ans. (1)**

**84.** 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

**Ans. (2)**

**85.** Magnetic field is parallel to the plane of coil then torque will be :–
(1) Maximum (2) Minimum (3) Zero (4) None of these

**Ans. (1)**

**BAR MAGNET**

**86.** 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

**Ans. (2)**

**87.** 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

**Ans. (4)**

**EARTH MAGNETIC FIELD**

**88.** If the angel 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

**Ans. (1)**

**89.** Two bar magnets having same geometry with magnetic moments M and 2M, are firstly placed in such a way that their similar poles are same side then its time period of oscillation is $T_1$. Now the polarity of one of the magnet is reversed then time period of oscillation is $T_2$, then :
(1) $T_1 < T_2$ (2) $T_1 = T_2$ (3) $T_1 > T_2$ (4) $T_2 = \infty$

**Ans. (1)**

**90.** 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) 0.6 G (3) 0.9G (4) 1.2G

**Ans. (3)**

**91.** A magnet makes 40 oscillations per minute at a place having magnetic field of $0.1 \times 10^{-5}$ 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) $0.25 \times 10^{-6}$ T (2) $0.36 \times 10^{-6}$ T (3) $0.66 \times 10^{-8}$ T (4) $1.2 \times 10^{-6}$ T

**Ans. (2)**

**92.** The magnetic needle of a tangent galvanometer is deflected at an angle 30°. The horizontal component of earth's magnetic field $0.34 \times 10^{-4}$ T is along the place of the coil. The magnetic field of coil :–
(1) $1.96 \times 10^{-4}$ T (2) $1.96 \times 10^{-5}$ T (3) $1.96 \times 10^{4}$ T (4) $1.96 \times 10^{5}$ T
**Ans. (2)**

**MAGNETIC PROPERTIES OF MATERIALS**

**93.** 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
**Ans. (1)**

**94.** Which of the following materials is repelled by an external magnetic field :–
(1) Iron (2) Cobalt (3) Steel (4) Copper
**Ans. (4)**

**95.** 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
**Ans. (1)**

**96.** To protect a sensitive instrument from external magnetic jerks, it should be placed in a container made of :–
(1) Non magnetic substance (2) Diamagnetic substance
(3) Paramagnetic substance (4) Ferromagnetic substance
**Ans. (4)**

**97.** 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
**Ans. (4)**

**98.** 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
**Ans. (2)**

**99.** Property possessed by only ferromagnetic substance is :–
(1) Attracting magnetic substance
(2) Hysteresis
(3) Susceptibility independent of temperature
(4) Directional property
**Ans. (2)**

**100.** 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

**Ans. (2)**

**101.** The magnetic moment of paramagnetic materials is :–

(1) Infinity (2) Zero (3) Constant but low (4) None of above

**Ans. (2)**

**102.** The cause of paramagnetism is :–

(1) Unpaired electrons

(2) Electron excess and spin motion of electrons

(3) Paired electrons and orbital motion of electrons

(4) Electrons and orbital motion of electrons

**Ans. (2)**

**103.** The cause of diamagnetism is :–

(1) Orbital motion of electrons

(2) Spin motion of electrons

(3) Paired electrons

(4) None of the above

**Ans. (1)**

**104.** The magnetic moment of diamagnetic materials is :–

(1) Infinity (2) Zero

(3) 100 amp–$m^2$ (4) None of the above

**Ans. (2)**

**105.** Which of the following statements is correct for diamagnetic materials :–

(1) $\mu_r < 1$ (2) $\chi$ is negative and low

(3) $\chi$ does not depend on temperature (4) All of the above

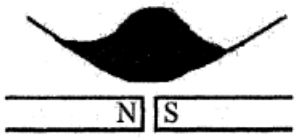
**Ans. (4)**

**106.** 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

**Ans. (2)**

**107.** The liquid in the watch glass in the following figure is :–




(1) Ferromagnetic (2) Paramagnetic (3) Diamagnetic (4) Nonmagnetic

**Ans. (2)**

**108.** Powerful permanent magnets are made of :–

(1) Cobalt (2) Aluminum (3) Tin–coal (4) Cobalt–steel

**Ans. (4)**

**109.** 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
**Ans.** **(2)**

**110.** 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
**Ans.** **(1)**

**111.** The relative permeability of air is :–
(1) Zero (2) 1.04 (3) Infinity (4) 1
**Ans.** **(2)**

**112.** 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
**Ans.** **(1)**

**113.** The correct measure of magnetic hardness of a material is :–
(1) Ramnant magnetism (2) Hysteresis loss
(3) Coercivity (4) Curie temperature
**Ans.** **(3)**

**114.** If the relative permeability of a material is 0.9999 then its nature will be :–
(1) Paramagnetic (2) Diamagnetic (3) Ferromagnetic (4) Non–magnetic
**Ans.** **(2)**

**115.** 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
**Ans.** **(3)**

**116.** 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)
**Ans.** **(2)**

**117.** Diamagnetic substance are :–
(1) Feebly attracted by magnets (2) Strongly attracted by magnets
(3) Feebly repelled by magnets (4) Strongly repelled by magnets
**Ans.** **(3)**

**118.** 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
**Ans. (2)**

**119.** Magnetic permeability is maximum for :
(1) Diamagnetic substance (2) Paramagnetic substance
(3) Ferromagnetic substance (4) All of these
**Ans. (3)**

**120.** Which one of the following is ferro–magnetic :–
(1) Co (2) Zn (3) Hg (4) Pt
**Ans. (1)**

**121.** For paramagnetic materials magnetic susceptibility is related with temperature as :–
(1) $\propto T^2$ (2) $\propto T^1$ (3) $\propto T^{-1}$ (4) $\propto T^{-2}$
**Ans. (3)**

**122.** 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) $T^2$
**Ans. (1)**

**123.** 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
**Ans. (1)**

**124.** Diamagnetic substances characterise by :–
(1) low and negative magnetic susceptibility
(2) low and positive magnetic susceptibility
(3) high and negative magnetic susceptibility
(4) high and positive magnetic susceptibility
**Ans. (1)**

**125.** 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 decreases with T
**Ans. (3)**

**126.** The material of permanent magnet has

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

**Ans. (4)**

**127.** Hysteresis property is shown by :–
(1) paramagnetic and diamagnetic
(2) diamagnetic
(3) paramagnetic
(4) ferromagnetic

**Ans. (4)**

**128.** 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

**Ans. (1)**

**129.** Which statement is true :
(1) atomic magnetic dipole moment of diamagnet is zero
(2) atomic magnetic dipole moment of paramagnet is zero
(3) atomic magnetic dipole moment of ferromagnet is zero
(4) ferromagnet is demagnetised rapidly after moving in magnetising field.

**Ans. (1)**

**130.** 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

**Ans. (2)**

**131.** Ferromagnetic substance contain :–
(1) empty subshell (2) partially empty subshell
(3) full fill subshell (4) none of these

**Ans. (2)**

**132.** Soft iron is used to make the core of transformer, because of its :
(1) low coercivity and low retantivity
(2) low coercivity and high retentivity
(3) high coercivity and high retenvity
(4) high coercivity and low retentivity

**Ans. (1)**

**133.** Above curie temperature ferromagnetic substance converts into :
(1) paramagnetic (2) diamagnetic (3) ferromagnetic (4) non magnetic

**Ans. (1)**

**134.** Relation between $\mu_r$ and $\chi$ will be :

(1) $\mu_r = 1 + \chi$ (2) $\chi = \mu_r + 1$ (3) $\frac{\mu_0}{\mu}$ (4) $\mu_0\chi$

**Ans. (1)**

**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 | 3 | 1 | 1 | 4 | 2 | 1 | 3 |
| Que. | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| Ans. | 3 | 4 | 4 | 4 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 3 | 2 | 3 | 3 |
| Que. | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 |
| Ans. | 4 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 1 | 2 | 1 | 1 | 2 | 4 | 3 |
| Que. | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| Ans. | 1 | 2 | 3 | 2 | 1 | 3 | 1 | 1 | 2 | 1 | 2 | 4 | 1 | 1 | 3 |
| Que. | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 |
| Ans. | 2 | 2 | 1 | 4 | 1 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 4 |
| Que. | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 |
| Ans. | 2 | 2 | 4 | 2 | 1 | 2 | 1 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 1 |
| Que. | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | |
| Ans. | 3 | 1 | 1 | 1 | 3 | 4 | 4 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | |