4. If a long hollow copper pipe carries a direct current, the magnetic field associated with the current will be

[CBSE PMT 1999; AFMC 1999; CPMT 1984, 2000; Pb. PET 2000; JIPMER 2002]

(a) Only inside the pipe
(b) Only outside the pipe
(c) Neither inside nor outside the pipe
(d) Both inside and outside the pipe

5. The magnetic field $d\vec{B}$ due to a small current element $d\vec{l}$ at a distance $\vec{r}$ and element carrying current i is,

or

Vector form of Biot-savart's law is

[CBSE PMT 1996; MP PET 2002; MP PMT 2000]

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

(c) $d\vec{B}=\frac{\mu_0}{4\pi}i^2\left(\frac{d\vec{l}\times\vec{r}}{r^2}\right)$ (d) $d\vec{B}=\frac{\mu_0}{4\pi}i\left(\frac{d\vec{l}\times\vec{r}}{r^3}\right)$

6. A charge q *coulomb* moves in a circle at n revolutions per second and the radius of the circle is r *metre*. Then magnetic field at the centre of the circle is

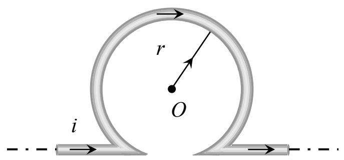
(a) $\frac{2\pi q}{nr}\times10^{-7}$ *N/amp/metre* (b) $\frac{2\pi q}{r}\times10^{-7}$ *N/amp/metre*

(c) $\frac{2\pi nq}{r}\times10^{-7}$ *N/amp/metre* (d) $\frac{2\pi q}{r}$ *N/amp/metre*

7. An infinitely long straight conductor is bent into the shape as shown in the figure. It carries a current of i *ampere* and the radius of the circular loop is r *metre*. Then the magnetic induction at its centre will be

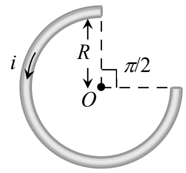
[MP PMT 1999]

(a) $\frac{\mu_0}{4\pi}\frac{2i}{r}(\pi+1)$
(b) $\frac{\mu_0}{4\pi}\frac{2i}{r}(\pi-1)$
(c) Zero
(d) Infinite



8. A current i *ampere* flows in a circular arc of wire whose radius is R, which subtend an angle $3\pi/2$ radian at its centre. The magnetic induction B at the centre is

(a) $\frac{\mu_0 i}{R}$
(b) $\frac{\mu_0 i}{2R}$
(c) $\frac{2\mu_0 i}{R}$
(d) $\frac{3\mu_0 i}{8R}$



9. A current i *ampere* flows along the inner conductor of a coaxial cable and returns along the outer conductor of the cable, then the magnetic induction at any point outside the conductor at a distance r *metre* from the axis is

(a) ∞ (b) Zero

(c) $\frac{\mu_0}{4\pi}\frac{2i}{r}$ (d) $\frac{\mu_0}{4\pi}\frac{2\pi i}{r}$

10. A straight section PQ of a circuit lies along the X-axis from $x=-\frac{a}{2}$ to $x=\frac{a}{2}$ and carries a steady current i. The magnetic field due to the section PQ at a point $X=+a$ will be

[MP PMT 1987]

(a) Proportional to a (b) Proportional to a^2
(c) Proportional to $1/a$ (d) Zero

11. A helium nucleus makes a full rotation in a circle of radius 0.8 *metre* in two seconds. The value of the magnetic field B at the centre of the circle will be

[CPMT 1988; KCET 1998; UPSEAT 2001]

(a) $\frac{10^{-19}}{\mu_0}$ (b) $10^{-19}\mu_0$

(c) $2\times10^{-10}\mu_0$ (d) $\frac{2\times10^{-10}}{\mu_0}$

12. A solenoid of 1.5 *metre* length and 4.0 *cm* diameter posses 10 turn per *cm*. A current of 5 *ampere* is flowing through it. The magnetic induction at axis inside the solenoid is

[CPMT 1990]

(a) $2\pi\times10^{-3}$ *Tesla* (b) $2\pi\times10^{-5}$ *Tesla*
(c) $4\pi\times10^{-2}$ *Gauss* (d) $2\pi\times10^{-5}$ *Gauss*

13. The magnetic induction at a point P which is distant 4 *cm* from a long current carrying wire is 10^{-8} *Tesla*. The field of induction at a distance

12 *cm* from the same current would be
[CBSE PMT 1990; DPMT 2001]

(a) 3.33×10^{-9} *Tesla* (b) 1.11×10^{-4} *Tesla*

(c) 3×10^{-3} *Tesla* (d) 9×10^{-2} *Tesla*

14. The strength of the magnetic field at a point *r* near a long straight current carrying wire is *B*. The field at a distance $\frac{r}{2}$ will be
[MP PMT 1990]

(a) $\frac{B}{2}$ (b) $\frac{B}{4}$

(c) 2*B* (d) 4*B*

15. Field at the centre of a circular coil of radius *r*, through which a current *I* flows is
[MP PMT 1993]

(a) Directly proportional to *r*

(b) Inversely proportional to *I*

(c) Directly proportional to *I*

(d) Directly proportional to I^2

16. A current of 0.1 *A* circulates around a coil of 100 turns and having a radius equal to 5 *cm*. The magnetic field set up at the centre of the coil is

($\mu_0 = 4\pi \times 10^{-7}$ *weber/ ampere– metre*) **[MP PMT 1993]**

(a) $4\pi \times 10^{-5}$ *tesla* (b) $8\pi \times 10^{-5}$ *tesla*

(c) 4×10^{-5} *tesla* (d) 2×10^{-5} *tesla*

17. The magnetic field *B* with in the solenoid having *n* turns per metre length and carrying a current of *i ampere* is given by
[MP PET 1993]

(a) $\frac{\mu_0 ni}{e}$ (b) $\mu_0 ni$

(c) $4\pi\mu_0 ni$ (d) *ni*

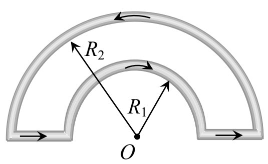
18. The magnetic induction at the centre *O* in the figure shown is
[IIT 1988; KCET 2002]

(a) $\frac{\mu_0 i}{4}\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

(b) $\frac{\mu_0 i}{4}\left(\frac{1}{R_1} + \frac{1}{R_2}\right)$

(c) $\frac{\mu_0 i}{4}(R_1 - R_2)$

(d) $\frac{\mu_0 i}{4}(R_1 + R_2)$



19. Field inside a solenoid is
[MP PMT 1993]

(a) Directly proportional to its length

(b) Directly proportional to current

(c) Inversely proportional to total number of turns

(d) Inversely proportional to current

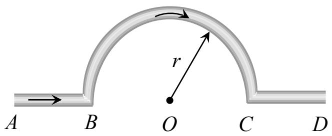
20. In the figure, shown the magnetic induction at the centre of there arc due to the current in portion AB will be

(a) $\frac{\mu_0 i}{r}$

(b) $\frac{\mu_0 i}{2r}$

(c) $\frac{\mu_0 i}{4r}$

(d) Zero



21. In the above question, the magnetic induction at *O* due to the whole length of the conductor is
[MP PMT/PET 1998; RPET 2002]

(a) $\frac{\mu_0 i}{r}$ (b) $\frac{\mu_0 i}{2r}$

(c) $\frac{\mu_0 i}{4r}$ (d) Zero

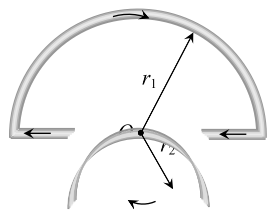
22. In the figure shown there are two semicircles of radii r_1 and r_2 in which a current *i* is flowing. The magnetic induction at the centre *O* will be

(a) $\frac{\mu_0 i}{r}(r_1 + r_2)$

(b) $\frac{\mu_0 i}{4}(r_1 - r_2)$

(c) $\frac{\mu_0 i}{4}\left(\frac{r_1 + r_2}{r_1 r_2}\right)$

(d) $\frac{\mu_0 i}{4}\left(\frac{r_2 - r_1}{r_1 r_2}\right)$



23. The magnetic moment of a current carrying loop is 2.1×10^{-25} $amp \times m^2$. The magnetic field at a point on its axis at a distance of $1\,Å$ is

(a) 4.2×10^{-2} *weber/ m^2* (b) 4.2×10^{-3} *weber/ m^2*

(c) 4.2×10^{-4} *weber/ m^2* (d) 4.2×10^{-5} *weber/ m^2*

24. Two straight horizontal parallel wires are carrying the same current in the same direction, *d* is the distance between the wires. You are provided with a small freely suspended magnetic needle. At which of the following positions will the orientation of the needle be independent of the magnitude of the current in the wires [NCERT 1983]

(a) At a distance $d/2$ from any of the wires

(b) At a distance $d/2$ from any of the wires in the horizontal plane

(c) Anywhere on the circumference of a vertical circle of radius *d* and centre halfway between the wires

(d) At points halfway between the wires in the horizontal plane

25. A particle carrying a charge equal to 100 times the charge on an electron is rotating per second in a circular path of radius 0.8 *metre*. The value of the magnetic field produced at the centre will be ($\mu_0 =$ permeability for vacuum) [CPMT 1986; KCET 2001; BHU 2001]

(a) $\frac{10^{-7}}{\mu_0}$ (b) $10^{-17}\mu_0$

(c) $10^{-6}\mu_0$ (d) $10^{-7}\mu_0$

26. A circular coil of radius *R* carries an electric current. The magnetic field due to the coil at a point on the axis of the coil located at a distance *r* from the centre of the coil, such that *r* >> *R*, varies as [EAMCET 1987; AIIMS 2004]

(a) $\frac{1}{r}$ (b) $\frac{1}{r^{3/2}}$

(c) $\frac{1}{r^2}$ (d) $\frac{1}{r^3}$

27. In hydrogen atom, an electron is revolving in the orbit of radius $0.53\,Å$ with 6.6×10^{15} *rotations/second*. Magnetic field produced at the centre of the orbit is [MP PET 2003]

(a) $0.125\,wb/m^2$ (b) $1.25\,wb/m^2$

(c) $12.5\,wb/m^2$ (d) $125\,wb/m^2$

28. The magnetic induction due to an infinitely long straight wire carrying a current *i* at a distance *r* from wire is given by [MP PET 1994]

(a) $|B| = \left(\frac{\mu_0}{4\pi}\right)\frac{2i}{r}$ (b) $|B| = \left(\frac{\mu_0}{4\pi}\right)\frac{r}{2i}$

(c) $|B| = \left(\frac{4\pi}{\mu_0}\right)\frac{2i}{r}$ (d) $|B| = \left(\frac{4\pi}{\mu_0}\right)\frac{r}{2i}$

29. Magnetic effect of current was discovered by [MP PET 1994]

(a) Faraday (b) Oersted

(c) Ampere (d) Bohr

30. Two concentric circular coils of ten turns each are situated in the same plane. Their radii are 20 and 40 *cm* and they carry respectively 0.2 and 0.3 *ampere* current in opposite direction. The magnetic field in $weber/m^2$ at the centre is [MP PMT 1994]

(a) $\frac{35}{4}\mu_0$ (b) $\frac{\mu_0}{80}$

(c) $\frac{7}{80}\mu_0$ (d) $\frac{5}{4}\mu_0$

31. A long solenoid has a radius *a* and number of turns per unit length is *n*. If it carries a current *i*, then the magnetic field on its axis is directly proportional to [MP PMT 1994]

(a) *ani* (b) *ni*

(c) $\frac{ni}{a}$ (d) $n^2 i$

32. A cell is connected between two points of a uniformly thick circular conductor. The magnetic field at the centre of the loop will be [MP PMT 1994]

(a) Zero (b) $\frac{\mu_0}{2a}(i_1 - i_2)$

(c) $\frac{\mu_0}{2a}(i_1 + i_2)$ (d) $\frac{\mu_0}{a}(i_1 + i_2)$

(Here i_1 and i_2 are the currents flowing in the two parts of the circular conductor of radius '*a*' and μ_0 has the usual meaning)

33. A long solenoid is formed by winding 20 *turns/cm*. The current necessary to produce a magnetic field of 20 *millitesla* inside the solenoid will be approximately

($\frac{\mu_0}{4\pi} = 10^{-7}$ *tesla–metre/ampere*) [MP PMT 1994]

(a) 8.0 *A* (b) 4.0 *A*

(c) 2.0 *A* (d) 1.0 *A*

34. A battery is connected between two points *A* and *B* on the circumference of a uniform conducting ring of radius *r* and resistance *R*. One of the arcs *AB* of the ring subtends an angle θ at the centre. The value of the magnetic induction at the centre due to the current in the ring is **[IIT 1995]**

(a) Proportional to $2(180° - \theta)$

(b) Inversely proportional to *r*

(c) Zero, only if $\theta = 180°$

(d) Zero for all values of θ

35. A current of 1 *ampere* is passed through a straight wire of length 2.0 *metres*. The magnetic field at a point in air at a distance of 3 *metres* from either end of wire and lying on the axis of wire will be **[MP PET 1995]**

(a) $\frac{\mu_0}{2\pi}$ (b) $\frac{\mu_0}{4\pi}$

(c) $\frac{\mu_0}{8\pi}$ (d) Zero

36. A long copper tube of inner radius *R* carries a current *i*. The magnetic field *B* inside the tube is **[MP PMT 1995]**

(a) $\frac{\mu_0 i}{2\pi R}$ (b) $\frac{\mu_0 i}{4\pi R}$

(c) $\frac{\mu_0 i}{2R}$ (d) Zero

37. A straight wire of length (π^2) *metre* is carrying a current of 2*A* and the magnetic field due to it is measured at a point distant 1 *cm* from it. If the wire is to be bent into a circle and is to carry the same current as before, the ratio of the magnetic field at its centre to that obtained in the first case would be **[Haryana CEE 1996]**

(a) 50 : 1 (b) 1 : 50

(c) 100 : 1 (d) 1 : 100

38. The direction of magnetic lines of forces close to a straight conductor carrying current will be **[RPMT 2002; RPET 2003; MP PET 2003]**

(a) Along the length of the conductor

(b) Radially outward

(c) Circular in a plane perpendicular to the conductor

(d) Helical

39. If the strength of the magnetic field produced 10*cm* away from a infinitely long straight conductor is 10^{-5} $Weber/m^2$, the value of the current flowing in the conductor will be **[MP PET 1996]**

(a) 5 *ampere* (b) 10 *ampere*

(c) 500 *ampere* (d) 1000 *ampere*

40. Due to 10 *ampere* of current flowing in a circular coil of 10 *cm* radius, the magnetic field produced at its centre is 3.14×10^{-3} $Weber/m^2$. The number of turns in the coil will be **[MP PET 1996]**

(a) 5000 (b) 100

(c) 50 (d) 25

41. There are 50 turns of a wire in every *cm* length of a long solenoid. If 4 *ampere* current is flowing in the solenoid, the approximate value of magnetic field along its axis at an internal point and at one end will be respectively **[MP PET 1996]**

(a) 12.6×10^{-3} $Weber/m^2$, 6.3×10^{-3} $Weber/m^2$

(b) 12.6×10^{-3} $Weber/m^2$, 25.1×10^{-3} $Weber/m^2$

(c) 25.1×10^{-3} $Weber/m^2$, 12.6×10^{-3} $Weber/m^2$

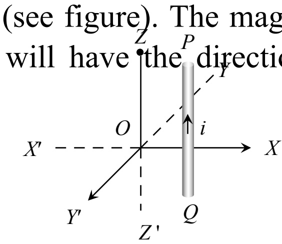
(d) 25.1×10^{-5} $Weber/m^2$, 12.6×10^{-5} $Weber/m^2$

42. A solenoid is 1.0 *metre* long and it has 4250 turns. If a current of 5.0 *ampere* is flowing through it, what is the magnetic field at its centre $[\mu_0 = 4\pi \times 10^{-7}$ $weber/amp\text{-}m]$ **[MP PMT 1996]**

(a) 5.4×10^{-2} $weber/m^2$ (b) 2.7×10^{-2} $weber/m^2$

(c) 1.35×10^{-2} $weber/m^2$ (d) 0.675×10^{-2} $weber/m^2$

43. A vertical wire kept in *Z-X* plane carries a current from *Q* to *P* (see figure). The magnetic field due to current will have the direction at the origin *O* along



(a) OX

(b) OX'

(c) OY

(d) OY'

44. One metre length of wire carries a constant current. The wire is bent to form a circular loop. The magnetic field at the centre of this loop is *B*. The same is now bent to form a circular loop of smaller radius to have four turns in the loop. The magnetic field at the centre of this new loop is

(a) 4 B (b) 16 B

(c) $B/2$ (d) $B/4$

45. In a hydrogen atom, an electron moves in a circular orbit of radius $5.2\times10^{-11}\ m$ and produces a magnetic induction of 12.56 T at its nucleus. The current produced by the motion of the electron will be (Given $\mu_0 = 4\pi\times10^{-7}\ Wb/A-m$)

[MP PET 1997]

(a) 6.53×10^{-3} *ampere* (b) 13.25×10^{-10} *ampere*

(c) 9.6×10^{6} *ampere* (d) 1.04×10^{-3} *ampere*

46. An arc of a circle of radius R subtends an angle $\frac{\pi}{2}$ at the centre. It carries a current i. The magnetic field at the centre will be

[MP PET 2003]

(a) $\frac{\mu_0 i}{2R}$ (b) $\frac{\mu_0 i}{8R}$

(c) $\frac{\mu_0 i}{4R}$ (d) $\frac{2\mu_0 i}{5R}$

47. At a distance of 10 cm from a long straight wire carrying current, the magnetic field is 0.04 T. At the distance of 40 cm, the magnetic field will be **[MP PMT 1997]**

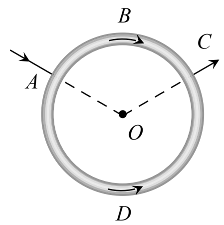
(a) 0.01 T (b) 0.02 T

(c) 0.08 T (d) 0.16 T

48. A uniform wire is bent in the form of a circle of radius R. A current I enters at A and leaves at C as shown in the figure :

If the length ABC is half of the length ADC, the magnetic field at the centre O will be

[MP PMT 1997]



(a) Zero

(b) $\frac{\mu_0 I}{2R}$

(c) $\frac{\mu_0 I}{4R}$

(d) $\frac{\mu_0 I}{6R}$

49. The magnetic induction at any point due to a long straight wire carrying a current is

[MP PMT/PET 1998]

(a) Proportional to the distance from the wire

(b) Inversely proportional to the distance from wire

(c) Inversely proportional to the square of the distance from the wire

(d) Does not depend on distance

50. The expression for magnetic induction inside a solenoid of length L carrying a current I and having N number of turns is

[MP PMT/PET 1998]

(a) $\frac{\mu_0}{4\pi}\frac{N}{LI}$ (b) $\mu_0 NI$

(c) $\frac{\mu_0}{4\pi}NLI$ (d) $\mu_0\frac{N}{L}I$

51. In a current carrying long solenoid, the field produced does not depend upon

[MP PET 1999]

(a) Number of turns per unit length

(b) Current flowing

(c) Radius of the solenoid

(d) All of the above three

52. The earth's magnetic induction at a certain point is $7\times10^{-5}\ Wb/m^2$. This is to be annulled by the magnetic induction at the centre of a circular conducting loop of radius 5 cm. The required current in the loop is

[MP PET 1999; MP PMT 2002]

(a) 0.56 A (b) 5.6 A

(c) 0.28 A (d) 2.8 A

53. Magnetic field due to 0.1 A current flowing through a circular coil of radius 0.1 m and 1000 turns at the centre of the coil is

[CBSE PMT 1999]

(a) $2\times10^{-1}\ T$ (b) $4.31\times10^{-2}\ T$

(c) $6.28\times10^{-4}\ T$ (d) $9.81\times10^{-4}\ T$

54. Magnetic field intensity at the centre of coil of 50 turns, radius 0.5 m and carrying a current of 2 A is

[CBSE PMT 1999; BHU 2002]

(a) $0.5\times10^{-5}\ T$ (b) $1.25\times10^{-4}\ T$

(c) $3\times10^{-5}\ T$ (d) $4\times10^{-5}\ T$

55. A circular coil 'A' has a radius R and the current flowing through it is I. Another circular coil 'B' has a radius $2R$ and if $2I$ is the current flowing through it, then the magnetic fields at the centre of the circular coil are in the ratio of

(*i.e.* B_A to B_B)

[CBSE PMT1993; AIEEE 2002]

(a) 4 : 1 (b) 2 : 1

(c) 3 : 1 (d) 1 : 1

56. The magnetic field at a distance *r* from a long wire carrying current *i* is 0.4 *Tesla*. The magnetic field at a distance 2*r* is

[CBSE PMT 1992; DPMT 2004]

(a) 0.2 *Tesla* (b) 0.8 *Tesla*

(c) 0.1 *Tesla* (d) 1.6 *Tesla*

57. A current *I* flows along the length of an infinitely long, straight and thin-walled pipe. Then **[IIT-JEE 1993]**

(a) The magnetic field at all points inside the pipe is the same but not zero

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

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

(d) The magnetic field is different at different points inside the pipe

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

[CPMT 1996; RPET 2002, 03]

(a) $\frac{\mu_0 ni}{2r}$ (b) $\frac{\mu_0}{2\pi}\frac{ni}{r}$

(c) $\frac{\mu_0 ni}{4r}$ (d) $\mu_0 ni$

59. A straight wire of diameter 0.5 *mm* carrying a current of 1 *A* is replaced by another wire of 1 *mm* diameter carrying the same current. The strength of magnetic field far away is

[CBSE PMT 1997, 99]

(a) Twice the earlier value

(b) Half of the earlier value

(c) Quarter of its earlier value

(d) Unchanged

60. A neutral point is obtained at the centre of a vertical circular coil carrying current. The angle between the plane of the coil and the magnetic meridian is **[SCRA 1998]**

(a) 0 (b) 45°

(c) 60° (d) 90°

61. One *Tesla* is equal to **[AFMC 1998]**

(a) 10^7 *gauss* (b) 10^{-4} *gauss*

(c) 10^4 *gauss* (d) 10^{-8} *gauss*

62. A current carrying wire in the neighborhood produces

[AFMC 1999]

(a) No field

(b) Electric field only

(c) Magnetic field only

(d) Electric and magnetic fields

63. Tesla is the unit of **[AIIMS 1999]**

(a) Electric flux (b) Magnetic flux

(c) Electric field (d) Magnetic field

64. The magnetic induction in air at a point 1*cm* away from a long wire that carries a current of 1*A*, will be

[BHU 1999]

(a) $1\times10^{-5}\,T$ (b) $2\times10^{-5}\,T$

(c) $3\times10^{-5}\,T$ (d) $4\times10^{-5}\,T$

65. The magnetic field at the centre of coil of *n* turns, bent in the form of a square of side 2*l* , carrying current *i,* is

[AMU (Engg.) 1999]

(a) $\frac{\sqrt{2}\mu_0 ni}{\pi l}$ (b) $\frac{\sqrt{2}\mu_0 ni}{2\pi l}$

(c) $\frac{\sqrt{2}\mu_0 ni}{4\pi l}$ (d) $\frac{2\mu_0 ni}{\pi l}$

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

[BHU 2000]

(a) $\frac{i\Delta l\sin\theta}{r^2}$ (b) $\frac{\mu_0}{4\pi}\frac{i\Delta l\sin\theta}{r}$

(c) $\frac{\mu_0}{4\pi}\frac{i\Delta l\sin\theta}{r^2}$ (d) $\frac{\mu_0}{4\pi}i\Delta l\sin\theta$

67. A toroid has number of turns per unit length *n*, current *i*, then the magnetic field is

(a) $\mu_0 ni$ (b) $\mu_0 n^2 i$

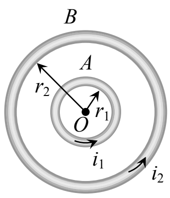
(c) $\mu_0 i / n$ (d) None of these

68. Magnetic field due to a ring having n turns at a distance x on its axis is proportional to (if r = radius of ring) **[RPET 2000]**

(a) $\frac{r}{(x^2+r^2)}$ (b) $\frac{r^2}{(x^2+r^2)^{3/2}}$

(c) $\frac{nr^2}{(x^2+r^2)^{3/2}}$ (d) $\frac{n^2r^2}{(x^2+r^2)^{3/2}}$

69. A and B are two concentric circular conductors of centre O and carrying currents i_1 and i_2 as shown in the adjacent figure. If ratio of their radii is 1 : 2 and ratio of the flux densities at O due to A and B is 1 : 3, then the value of i_1 / i_2 is **[KCET 2000]**



(a) $\frac{1}{6}$

(b) $\frac{1}{4}$

(c) $\frac{1}{3}$

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

70. A long straight wire carries an electric current of $2A$. The magnetic induction at a perpendicular distance of $5m$ from the wire is

(a) $4\times10^{-8}\,T$ (b) $8\times10^{-8}\,T$

(c) $12\times10^{-8}\,T$ (d) $16\times10^{-8}\,T$

71. A straight wire carrying a current 10 A is bent into a semicircular arc of radius 5 cm. The magnitude of magnetic field at the center is

(a) $1.5\times10^{-5}\,T$ (b) $3.14\times10^{-5}\,T$

(c) $6.28\times10^{-5}\,T$ (d) $19.6\times10^{-5}\,T$

72. A long solenoid of length L has a mean diameter D. It has n layers of windings of N turns each. If it carries a current 'i' the magnetic field at its centre will be **[MP PMT 2000]**

(a) Proportional to D

(b) Inversely proportional to D

(c) Independent of D

(d) Proportional to L

73. A circular loop of radius 0.0157m carries a current of 2.0 amp. The magnetic field at the centre of the loop is

$(\mu_0 = 4\pi\times10^{-7}\ weber/amp-m)$

(a) $1.57\times10^{-5}\ weber/m^2$ (b) $8.0\times10^{-5}\ weber/m^2$

(c) $2.5\times10^{-5}\ weber/m^2$ (d) $3.14\times10^{-5}\ weber/m^2$

74. A long solenoid has 200 turns per cm and carries a current of 2.5 $amps$. The magnetic field at its centre is $(\mu_0 = 4\pi\times10^{-7}\ weber/amp\text{-}m)$

(a) $3.14\times10^{-2}\ weber/m^2$

(b) $6.28\times10^{-2}\ weber/m^2$

(c) $9.42\times10^{-2}\ weber/m^2$

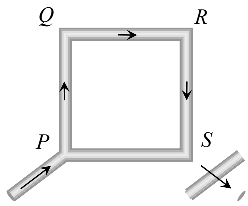
(d) $12.56\times10^{-2}\ weber/m^2$

75. Two concentric coplanar circular loops of radii r_1 and r_2 carry currents of respectively i_1 and i_2 in opposite directions (one clockwise and the other anticlockwise.) The magnetic induction at the centre of the loops is half that due to i_1 alone at the centre. If $r_2 = 2r_1$. the value of i_2 / i_1 is **[MP PET 2000]**

(a) 2 **[EAMCET (Med.) 2000]** (b) 1/2

(c) 1/4 (d) 1

76. $PQRS$ is a square loop made of uniform conducting wire the current enters the loop at P and leaves at S. Then the magnetic field will be **[CPMT 2000]** **[KCET 2000]**



(a) Maximum at the centre of the loop

(b) Zero at the centre of loop

(c) Zero at all points inside the loop

(d) Zero at all points outside of the loop

77. Magnetic fields at two points on the axis of a circular coil at a distance of 0.05m and 0.2m

from the centre are in the ratio 8 : 1. The radius of the coil is

[KCET 2002]

(a) 1.0 *m* (b) 0.1 *m*

(c) 0.15 *m* (d) 0.2 *m*

78. An electric current passes through a long straight wire. At a distance 5 *cm* from the wire, The magnetic field is *B*. The field at 20 *cm* from the wire would be

[CPMT 2001; Pb PET 2002]

(a) $\frac{B}{6}$ (b) $\frac{B}{4}$

(c) $\frac{B}{3}$ (d) $\frac{B}{2}$

79. 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 flux density at the centre of a coil

[AIIMS 2001]

(a) 1.679×10^{-5} *tesla* (b) 2.028×10^{-4} *tesla*

(c) 1.257×10^{-3} *tesla* (d) 1.512×10^{-6} *tesla*

80. The dimension of the magnetic field intensity *B* is

[MP PET 2001]

(a) $MLT^{-2}A^{-1}$ (b) $MT^{-2}A^{-1}$

(c) ML^2TA^{-2} (d) $M^2LT^{-2}A^{-1}$

81. A current of 2 *amp*. flows in a long, straight wire of radius 2 *mm.* The intensity of magnetic field on the axis of the wire is

(a) $\left(\frac{\mu_o}{\pi}\right)\times10^3$ *Tesla* (b) $\left(\frac{\mu_o}{2\pi}\right)\times10^3$ *Tesla*

(c) $\left(\frac{2\mu_o}{\pi}\right)\times10^3$ *Tesla* (d) Zero

82. The magnetic field at the centre of a circular coil of radius *r* carrying current *I* is B_1. The field at the centre of another coil of radius 2 *r* carrying same current *I* is B_2. The ratio $\frac{B_1}{B_2}$ is

(a) $\frac{1}{2}$ (b) 1

(c) 2 (d) 4

83. 1*A* current flows through an infinitely long straight wire. The magnetic field produced at a point 1 *metres* away from it is

[MP PMT 2001]

(a) 2×10^{-3} *Tesla* (b) $\frac{2}{10}$ *Tesla*

(c) 2×10^{-7} *Tesla* (d) $2\pi\times10^{-6}$ Tesla

84. Two infinitely long parallel wires carry equal current in same direction. The magnetic field at a mid point in between the two wires is

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

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

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

(d) Zero

85. A wire in the form of a square of side '*a*' carries a current *i*. Then the magnetic induction at the centre of the square wire is (Magnetic permeability of free space = μ_o) [EAMCET 2001]

(a) $\frac{\mu_0 i}{2\pi a}$ (b) $\frac{\mu_0 i\sqrt{2}}{\pi a}$

(c) $\frac{2\sqrt{2}\mu_o i}{\pi a}$ (d) $\frac{\mu_0 i}{\sqrt{2}\pi a}$

86. What should be the current in a circular coil of radius 5*cm* to annul $B_H = 5\times10^{-5}\,T$

(a) 0.4 *A* (b) 4 *A*

(c) 40 *A* (d) 1 *A*

87. A current of 0.1 *A* circulates around a coil of 100 turns and having a radius equal to 5*cm*. The magnetic field set up at the centre of the coil is ($\mu_0 = 4\pi\times10^{-7}$ *weber/amp-metre*)

[MP PET 2001] [DPMT 2002]

(a) 2×10^{-5} *Tesla* (b) 4×10^{-5} *Tesla*

(c) $8\pi\times10^{-5}$ *Tesla* (d) $4\pi\times10^{-5}$ *Tesla*

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

[KCET 2001; UPSEAT 2001, 02]

(a) $\frac{\mu_0 ne}{2r}$ (b) $\frac{\mu_0 n^2 e}{2r}$

[MP PET 2001]

(c) $\frac{\mu_0 ne}{2\pi r}$ (d) Zero

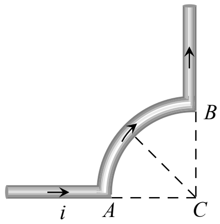
89. A long solenoid has *n* turns per meter and current *I A* is flowing through it. The magnetic field at the ends of the solenoid is [MP PMT

(a) $\frac{\mu_0 nI}{2}$ (b) $\mu_0 nI$

(c) Zero (d) $2\mu_0 nI$

90. A wire carrying current i is shaped as shown. Section AB is a quarter circle of radius r. The magnetic field is directed

[KCET 2002]



(a) At an angle $\pi/4$ to the plane of the paper

(b) Perpendicular to the plane of the paper and directed in to the paper

(c) Along the bisector of the angle ACB towards AB

(d) Along the bisector of the angle ACB away from AB

91. Two long straight wires are set parallel to each other. Each carries a current i in the same direction and the separation between them is $2r$. The intensity of the magnetic field midway between them is

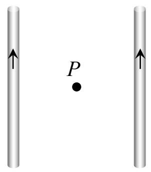
[Kerala PET 2002; DCE 2002]

(a) $\mu_o i/r$

(b) $4\mu_o i/r$

(c) Zero

(d) $\mu_o i/4r$



92. A magnetic field can be produced by **[AIEEE 2002]**

(a) A moving charge (b) A changing electric field

(c) None of these (d) Both of these

93. Unit of magnetic permeability is

(a) *Amp/metre* (b) *Amp/* m^2

(c) *Henry* (d) *Henry/metre*

94. A long straight wire carries a current of π *amp*. The magnetic field due to it will be 5×10^{-5} *weber/m*^{2} at what distance from the wire [μ_o = permeability of air]

[MP PMT 2002]

(a) $10^4\mu_o$ *metre* (b) $\frac{10^4}{\mu_o}$ *metre*

(c) $10^6\mu_o$ *metre* (d) $\frac{10^6}{\mu_o}$ *metre*

95. When a certain length of wire is turned into one circular loop, the magnetic induction at the centre of coil due to some current flowing is B_1 If the same wire is turned into three loops to make a circular coil, the magnetic induction at the center of this coil for the same current will be

[MP PMT 2002]

(a) B_1 (b) $9B_1$

(c) $3B_1$ (d) $27B_1$

96. Gauss is unit of which quantity

(a) H (b) B

(c) ϕ (d) I

97. On connecting a battery to the two corners of a diagonal of a square conductor frame of side a the magnitude of the magnetic field at the centre will be **[MP PET 2002]**

(a) Zero (b) $\frac{\mu_o}{\pi a}$

(c) $\frac{2\mu_o}{\pi a}$ (d) $\frac{4\mu_o i}{\pi a}$

98. The ratio of the magnetic field at the centre of a current carrying coil of the radius a and at a distance 'a' from centre of the coil and perpendicular to the axis of coil is

[MP PET 2002]

(a) $\frac{1}{\sqrt{2}}$ (b) $\sqrt{2}$

(c) $\frac{1}{2\sqrt{2}}$ (d) $2\sqrt{2}$

99. A part of a long wire carrying a current i is bent into a circle of radius r as shown in figure. The net magnetic field at the centre O of the circular loop is

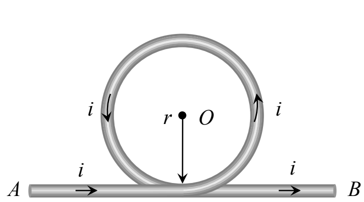
[AFMC 2002] **[UPSEAT 2002]**

(a) $\frac{\mu_o i}{4r}$

(b) $\frac{\mu_o i}{2r}$

(c) $\frac{\mu_o i}{2\pi r}(\pi+1)$

(d) $\frac{\mu_o i}{2\pi r}(\pi-1)$



100. The current in the windings on a toroid is $2.0A$. There are 400 turns and the mean circumferential length is 40*cm*. If the inside magnetic field is 1.0*T*, the relative permeability is near to **[AMU (Med.) 2002]**

(a) 100 (b) 200
(c) 300 (d) 400

101. "On flowing current in a conducting wire the magnetic field produces around it." It is a law of **[RPET 2003]**

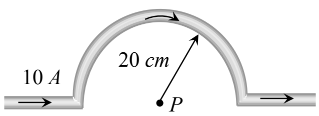
(a) Lenz (b) Ampere
(c) Ohm (d) Maxwell

102. The magnetic field near a current carrying conductor is given by **[Orissa JEE 2003]**

(a) Coulomb's law (b) Lenz' law
(c) Biot-savart's law (d) Kirchoff's law

103. A current of 10*A* is passing through a long wire which has semicircular loop of the radius 20*cm* as shown in the figure. Magnetic field produced at the centre of the loop is **[Orissa JEE 2003]**

(a) $10\pi\mu T$
(b) $5\pi\mu T$
(c) $4\pi\mu T$
(d) $2\pi\mu T$



104. A wire in the form of a circular loop of one turn carrying a current produces a magnetic field *B* at the centre. If the same wire is looped into a coil of two turns and carries the same current, the new value of magnetic induction at the centre is **[CBSE 2002; KCET 2003]**

(a) $5B$ (b) $3B$
(c) $2B$ (d) $4B$

105. 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 **[CBSE PMT 2003]**

(a) *B* (b) 2 *B*
(c) 4 *B* (d) *B*/2

106. A long straight wire carrying current of 30*A* is placed in an external uniform magnetic field of induction $4 \times 10^{-4} T$. The magnetic field is acting parallel to the direction of current. The magnitude of the resultant magnetic induction in *tesla* at a point 2.0 cm away from the wire is **[EAMCET 2003]**

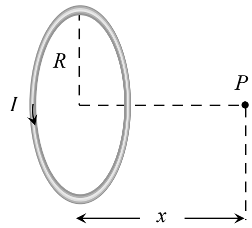
(a) 10^{-4} (b) 3×10^{-4}
(c) 5×10^{-4} (d) 6×10^{-4}

107. The earth's magnetic field at a given point is $0.5 \times 10^{-5} Wb\text{-}m^{-2}$. This field is to be annulled by magnetic induction at the center of a circular conducting loop of radius 5.0*cm*. The current required to be flown in the loop is nearly

(a) 0.2 *A* (b) 0.4*A*
(c) 4*A* (d) 40*A*

108. A coil having *N* turns carry a current *I* as shown in the figure. The magnetic field intensity at point *P* is **[BHU 2003; CPMT 2004]**

(a) $\frac{\mu_0 NIR^2}{2(R^2 + x^2)^{3/2}}$
(b) $\frac{\mu_0 NI}{2R}$
(c) $\frac{\mu_0 NIR^2}{(R + x)^2}$
(d) Zero

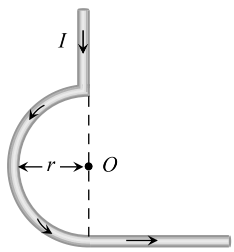


109. Two similar coils are kept mutually perpendicular such that their centres coincide. At the centre, find the ratio of the magnetic field due to one coil and the resultant magnetic field by both coils, if the same current is flown **[BHU 2003; CPMT 2004]**

(a) $1 : \sqrt{2}$ (b) 1 : 2
(c) 2 : 1 (d) $\sqrt{3} : 1$

110. In the figure, what is the magnetic field at the point *O* **[MP PMT 2004]**

(a) $\frac{\mu_0 I}{4\pi r}$
(b) $\frac{\mu_0 I}{4\pi r} + \frac{\mu_0 I}{2\pi r}$
(c) $\frac{\mu_0 I}{4r} + \frac{\mu_0 I}{4\pi r}$
(d) $\frac{\mu_0 I}{4r} - \frac{\mu_0 I}{4\pi r}$



111. The magnetic moment of a current (*i*) carrying circular coil of radius (*r*) and number of turns (*n*) varies as **[AIIMS 2004]**

(a) $1/r^2$ (b) $1/r$
(c) r (d) r^2

112. A current flows in a conductor from east to west. The direction of the magnetic field at a points above the conductor is ..... **[KCET 2004]**

(a) Towards north (b) Towards south
(c) Towards east (d) Towards west

113. A long wire carries a steady current. It is bent into a circle of one turn and the magnetic field at the centre of the coil is *B*. It is then bent into a circular loop of *n* turns. The magnetic field at the centre of the coil will be **[AIEEE 2004]**
(a) nB (b) n^2B
(c) $2nB$ (d) $2n^2B$

114. The magnetic field due to a current carrying circular loop of radius 3 *cm* at a point on the axis at a distance of 4 *cm* from the centre is 54 μT. What will be its value at the centre of the loop **[AIEEE 2004]**
(a) 250 μT (b) 150 μT
(c) 125 μT (d) 75 μT

115. The magnetic induction at the centre of a current carrying circular of coil radius *r*, is **[J & K CET 2004]**
(a) Directly proportional to *r*
(b) Inversely proportional *r*
(c) Directly proportional to r^2
(d) Inversely proportional to r^2

116. The current is flowing in south direction along a power line. The direction of magnetic field above the power line (neglecting earth's field) is **[Pb. PMT 2004; Kerala PMT 2004]**
(a) South (b) East
(c) North (d) West

117. Two wires of same length are shaped into a square and a circle. If they carry same current, ratio of the magnetic moment is **[DCE 2002]**
(a) $2 : \pi$ (b) $\pi : 2$
(c) $\pi : 4$ (d) $4 : \pi$

118. 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 **[DPMT 2003]**
(a) Four times (b) Same
(c) Half (d) Double

119. An electron is revolving round a proton, producing a magnetic field of 16 *weber/m*^{2} in a circular orbit of radius 1Å. It's angular velocity will be **[RPMT 2002]**
(a) 10^{17} *rad/sec* (b) $1/2\pi \times 10^{12}$ *rad/sec*
(c) $2\pi \times 10^{12}$ *rad/sec* (d) $4\pi \times 10^{12}$ *rad/sec*

120. 20 *ampere* current is flowing in a long straight wire. The intensity of magnetic field at a distance 10 *cm* from the wire will be **[Pb. PMT 2003]**
(a) 4×10^{-5} Wb/m^2 (b) 9×10^{-5} Wb/m^2
(c) 8×10^{-5} Wb/m^2 (d) 6×10^{-5} Wb/m^2

121. The field due to a long straight wire carrying a current *I* is proportional to **[MP PMT 1993]**
(a) I (b) I^3
(c) $\sqrt{I}$ (d) $1/I$

122. Two concentric coils each of radius equal to 2π *cm* are placed at right angles to each other. 3 *ampere* and 4 *ampere* are the currents flowing in each coil respectively. The magnetic induction in $Weber/m^2$ at the centre of the coils will be $(\mu_0 = 4\pi \times 10^{-7}\ Wb/A.m)$ **[AIEEE 2005]**
(a) 5×10^{-5} (b) 7×10^{-5}
(c) 12×10^{-5} (d) 10^{-5}

123. A wire carrying current *I* and other carrying 2*I* in the same direction produces a magnetic field *B* at the mid point. What will be the field when 2*I* wire is switched off **[AFMC 2005]**
(a) $B/2$ (b) $2B$
(c) B (d) $4B$

124. Two long parallel wires *P* and *Q* are both perpendicular to the plane of the paper with distance 5 *m* between them. If *P* and *Q* carry current of 2.5 *amp* and 5 *amp* respectively in the same direction, then the magnetic field at a point half way between the wires is **[Kerala PMT 2005]**
(a) $\frac{\sqrt{3}\mu_0}{2\pi}$ (b) $\frac{\mu_0}{\pi}$

(c) $\frac{3\mu_0}{2\pi}$ (d) $\frac{\mu_0}{2\pi}$

(e) $\frac{\sqrt{3}\mu_0}{\pi}$

125. The direction of magnetic lines of force produced by passing a direct current in a conductor is given by **[J & K CET 2005]**

(a) Lenz's law (b) Fleming's left hand rule

(c) Right hand palm rule (d) Maxwell's law

126. For the magnetic field to be maximum due to a small element of current carrying conductor at a point, the angle between the element and the line joining the element to the given point must be **[J & K CET 2005]**

(a) 0° (b) 90°

(c) 180° (d) 45°

Motion of Charged Particle In Magnetic Field

1. A proton moving with a constant velocity passes through a region of space without any change in its velocity. If $\vec{E}$ and $\vec{B}$ represent the electric and magnetic fields respectively, then this region of space may have **[IIT-JEE 1985; AMU 1995; AFMC 2001; Roorkee 2000; AMU (Med.) 2000]**

(a) $E = 0, B = 0$ (b) $E = 0, B \neq 0$

(c) $E \neq 0, B = 0$ (d) $E \neq 0, B \neq 0$

2. A uniform electric field and a uniform magnetic field are produced, pointed in the same direction. An electron is projected with its velocity pointing in the same direction **[NCERT 1980; CBSE PMT 1993; JIPMER 1997; AIEEE 2005]**

(a) The electron will turn to its right

(b) The electron will turn to its left

(c) The electron velocity will increase in magnitude

(d) The electron velocity will decrease in magnitude

3. Two particles X and Y having equal charges, after being accelerated through the same potential difference, enter a region of uniform magnetic field and describes circular path of radius R_1 and R_2 respectively. The ratio of mass of X to that of Y is **[IIT-JEE 1988; CBSE PMT1995; MP PMT 2001]**

(a) $\left(\frac{R_1}{R_2}\right)^{1/2}$ (b) $\frac{R_2}{R_1}$

(c) $\left(\frac{R_1}{R_2}\right)^2$ (d) $\frac{R_1}{R_2}$

4. A beam of ions with velocity $2 \times 10^5\ m/s$ enters normally into a uniform magnetic field of 4×10^{-2} *tesla*. If the specific charge of the ion is $5 \times 10^7\ C/kg$, then the radius of the circular path described will be **[NCERT 1983; BVP 2003]**

(a) 0.10 *m* (b) 0.16 *m*

(c) 0.20 *m* (d) 0.25 *m*

5. The radius of curvature of the path of the charged particle in a uniform magnetic field is directly proportional to **[MNR 1995; UPSEAT 1999, 2000]**

(a) The charge on the particle

(b) The momentum of the particle

(c) The energy of the particle

(d) The intensity of the field

6. An electron has mass $9 \times 10^{-31}\ kg$ and charge $1.6 \times 10^{-19}\ C$ is moving with a velocity of $10^6\ m/s$, enters a region where magnetic field exists. If it describes a circle of radius 0.10 *m*, the intensity of magnetic field must be **[NCERT 1982; CPMT 1989; DCE 2005]**

(a) $1.8 \times 10^{-4}\ T$ (b) $5.6 \times 10^{-5}\ T$

(c) $14.4 \times 10^{-5}\ T$ (d) $1.3 \times 10^{-6}\ T$

7. A proton (mass *m* and charge +*e*) and an α-particle (mass 4*m* and charge +2*e*) are projected with the same kinetic energy at right angles to the uniform magnetic field. Which one of the following statements will be true **[NCERT 1983]**

(a) The α-particle will be bent in a circular path with a small radius that for the proton

(b) The radius of the path of the α-particle will be greater than that of the proton

(c) The α-particle and the proton will be bent in a circular path with the same radius

(d) The $\alpha-$particle and the proton will go through the field in a straight line

8. A charged particle moving in a magnetic field experiences a resultant force **[MP PMT 1994]**

(a) In the direction of field
(b) In the direction opposite to that field
(c) In the direction perpendicular to both the field and its velocity
(d) None of the above

9. If the direction of the initial velocity of the charged particle is perpendicular to the magnetic field, then the orbit will be

or

The path executed by a charged particle whose motion is perpendicular to magnetic field is **[MP PMT 1993; CPMT 1996]**

(a) A straight line (b) An ellipse
(c) A circle (d) A helix

10. If the direction of the initial velocity of the charged particle is neither along nor perpendicular to that of the magnetic field, then the orbit will be **[MP PET 1993]**

(a) A straight line (b) An ellipse
(c) A circle (d) A helix

11. Particles having positive charges occasionally come with high velocity from the sky towards the earth. On account of the magnetic field of earth, they would be deflected towards the **[NCERT 1977]**

(a) North (b) South
(c) East (d) West

12. A 2 *MeV* proton is moving perpendicular to a uniform magnetic field of 2.5 *tesla*. The force on the proton is **[CPMT 1989]**

(a) $2.5\times10^{-10}\ N$ (b) $7.6\times10^{-11}\ N$
(c) $2.5\times10^{-11}\ N$ (d) $7.6\times10^{-12}\ N$

13. A charged particle moves with velocity v in a uniform magnetic field $\vec{B}$. The magnetic force experienced by the particle is **[CBSE PMT 1990]**

(a) Always zero
(b) Never zero
(c) Zero, if $\vec{B}$ and $\vec{v}$ are perpendicular
(d) Zero, if $\vec{B}$ and $\vec{v}$ are parallel

14. A proton is moving along *Z*-axis in a magnetic field. The magnetic field is along *X*-axis. The proton will experience a force along

(a) *X*-axis (b) *Y*-axis
(c) *Z*-axis (d) Negative *Z*-axis

15. A proton of mass m and charge $+e$ is moving in a circular orbit in a magnetic field with energy 1 *MeV*. What should be the energy of $\alpha-$particle (mass = $4m$ and charge = + $2e$), so that it can revolve in the path of same radius **[BHU 1997]**

(a) 1 *MeV* (b) 4 *MeV*
(c) 2 *MeV* (d) 0.5 *MeV*

16. An electron is moving with a speed of $10^8\ m/\sec$ perpendicular to a uniform magnetic field of intensity B. Suddenly intensity of the magnetic field is reduced to $B/2$. The radius of the path becomes from the original value of r **[MP PET 1993]**

(a) No change (b) Reduces to $r/2$
(c) Increases to $2r$ (d) Stops moving

17. A proton and an $\alpha-$particle enter a uniform magnetic field perpendicularly with the same speed. If proton takes 25 μ sec to make 5 revolutions, then the periodic time for the $\alpha-$particle would be **[MP PET 1993]**

(a) 50 μ sec (b) 25 μ sec
(c) 10 μ sec (d) 5 μ sec

18. A proton (mass $=1.67\times10^{-27}\ kg$ and charge $=1.6\times10^{-19}\ C$) enters perpendicular to a magnetic field of intensity 2 $weber/m^2$ with a velocity $3.4\times10^7\ m/\sec$. The acceleration of the proton should be **[DPMT 1999]**

(a) $6.5\times10^{15}\ m/\sec^2$ (b) $6.5\times10^{13}\ m/\sec^2$
(c) $6.5\times10^{11}\ m/\sec^2$ (d) $6.5\times10^{9}\ m/\sec^2$

19. An $\alpha-$particle travels in a circular path of radius 0.45 m in a magnetic field $B=1.2\ Wb/m^2$ with a speed of $2.6\times10^7\ m/\sec$. The period of revolution of the $\alpha-$particle is

(a) 1.1×10^{-5} sec (b) 1.1×10^{-6} sec
(c) 1.1×10^{-7} sec (d) 1.1×10^{-8} sec

20. A uniform magnetic field B is acting from south to north and is of magnitude 1.5 Wb/m^2. If a proton having mass $=1.7\times10^{-27}\ kg$ and charge $=1.6\times10^{-19}\ C$ moves in this field vertically downwards with energy 5 *MeV*, then the force acting on it will be

[Pb. PMT 2002]

(a) $7.4\times10^{12}\,N$ (b) $7.4\times10^{-12}\,N$

(c) $7.4\times10^{19}\,N$ (d) $7.4\times10^{-19}\,N$

21. A strong magnetic field is applied on a stationary electron, then **[BIT 1989; MP PMT 1995; CPMT 1999]**

(a) The electron moves in the direction of the field

(b) The electron moves in an opposite direction

(c) The electron remains stationary

(d) The electron starts spinning

22. A uniform magnetic field acts at right angles to the direction of motion of electrons. As a result, the electron moves in a circular path of radius 2 *cm*. If the speed of the electrons is doubled, then the radius of the circular path will be

[CBSE PMT 1991]

(a) 2.0 *cm* (b) 0.5 *cm*

(c) 4.0 *cm* (d) 1.0 *cm*

23. A deutron of kinetic energy 50 *keV* is describing a circular orbit of radius 0.5 *metre* in a plane perpendicular to magnetic field $\vec{B}$. The kinetic energy of the proton that describes a circular orbit of radius 0.5 *metre* in the same plane with the same $\vec{B}$ is

[CBSE PMT 1991]

(a) 25 *keV* (b) 50 *keV*

(c) 200 *keV* (d) 100 *keV*

24. If a proton is projected in a direction perpendicular to a uniform magnetic field with velocity *v* and an electron is projected along the lines of force, what will happen to proton and electron **[DPMT 1979]**

(a) The electron will travel along a circle with constant speed and the proton will move along a straight line

(b) Proton will move in a circle with constant speed and there will be no effect on the motion of electron

(c) There will not be any effect on the motion of electron and proton

(d) The electron and proton both will follow the path of a parabola

25. An electron is travelling horizontally towards east. A magnetic field in vertically downward direction exerts a force on the electron along

[EAMCET 1984]

(a) East (b) West

(c) North (d) South

26. Lorentz force can be calculated by using the formula

[MP PET 1994, 2002, 03; CBSE PMT 2002]

(a) $\vec{F}=q(\vec{E}+\vec{v}\times\vec{B})$ (b) $\vec{F}=q(\vec{E}-\vec{v}\times\vec{B})$

(c) $\vec{F}=q(\vec{E}+\vec{v}\cdot\vec{B})$ (d) $\vec{F}=q(\vec{E}\times\vec{B}+\vec{v})$

27. A magnetic field **[MP PET 1994; Pb PMT 2003]**

(a) Always exerts a force on a charged particle

(b) Never exerts a force on a charged particle

(c) Exerts a force, if the charged particle is moving across the magnetic field lines

(d) Exerts a force, if the charged particle is moving along the magnetic field lines

28. A proton enters a magnetic field of flux density $1.5\,weber/m^2$ with a velocity of $2\times10^7\,m/\sec$ at an angle of 30° with the field. The force on the proton will be

[MP PET 1994 ; Pb. PMT 2004]

(a) $2.4\times10^{-12}\,N$ (b) $0.24\times10^{-12}\,N$

(c) $24\times10^{-12}\,N$ (d) $0.024\times10^{-12}\,N$

29. If a particle of charge $10^{-12}\,coulomb$ moving along the $\hat{x}-$direction with a velocity $10^5\,m/s$ experiences a force of $10^{-10}\,newton$ in $\hat{y}-$direction due to magnetic field, then the minimum magnetic field is

[MP PMT 1994]

(a) $6.25\times10^3\,tesla$ in $\hat{z}-$direction

(b) $10^{-15}\,tesla$ in $\hat{z}-$direction

(c) $6.25\times10^{-3}\,tesla$ in $\hat{z}-$direction

(d) $10^{-3}\,tesla$ in $\hat{z}-$direction

30. If a proton, deutron and $\alpha-$particle on being accelerated by the same potential difference enters perpendicular to the magnetic field, then the ratio of their kinetic energies is

[MP PMT 2003; J & K CET 2005]

(a) 1 : 2 : 2 (b) 2 : 2 : 1

(c) 1 : 2 : 1 (d) 1 : 1 : 2

31. Which of the following statement is true

[Manipal MEE 1995]

(a) The presence of a large magnetic flux through a coil maintains a current in the coil if the circuit is continuous

(b) A coil of a metal wire kept stationary in a non-uniform magnetic field has an e.m.f. induced in it

(c) A charged particle enters a region of uniform magnetic field at an angle of 85° to the magnetic lines of force; the path of the particle is a circle

(d) There is no change in the energy of a charged particle moving in a magnetic field although a magnetic force is acting on it

32. An electron and a proton enter region of uniform magnetic field in a direction at right angles to the field with the same kinetic energy. They describe circular paths of radius r_e and r_p respectively. Then **[Manipal MEE 1995]**

(a) $r_e = r_p$

(b) $r_e < r_p$

(c) $r_e > r_p$

(d) r_e may be less than or greater than r_p depending on the direction of the magnetic field

33. A proton of mass $1.67 \times 10^{-27} kg$ and charge $1.6 \times 10^{-19} C$ is projected with a speed of $2 \times 10^6 m/s$ 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 **[IIT-JEE 1995]**

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

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

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

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

34. A proton and a deutron both having the same kinetic energy, enter perpendicularly into a uniform magnetic field *B*. For motion of proton and deutron on circular path of radius R_p and R_d respectively, the correct statement is **[MP PET 1995]**

(a) $R_d = \sqrt{2}\, R_p$ (b) $R_d = R_p / \sqrt{2}$

(c) $R_d = R_p$ (d) $R_d = 2R_p$

35. A proton (or charged particle) moving with velocity *v* is acted upon by electric field *E* and magnetic field *B*. The proton will move undeflected if

[MP PMT 1995, 2003; UPSEAT 2002; DPMT 2003]

(a) *E* is perpendicular to *B*

(b) *E* is parallel to *v* and perpendicular to *B*

(c) *E*, *B* and *v* are mutually perpendicular and $v = \frac{E}{B}$

(d) *E* and *B* both are parallel to *v*

36. A proton and an electron both moving with the same velocity *v* enter into a region of magnetic field directed perpendicular to the velocity of the particles. They will now move in circular orbits such that **[MP PMT 1995]**

(a) Their time periods will be same

(b) The time period for proton will be higher

(c) The time period for electron will be higher

(d) Their orbital radii will be same

37. A charge + *Q* is moving upwards vertically. It enters a magnetic field directed to the north. The force on the charge will be towards **[MP PMT 1995; AMU (Engg.) 2000]**

(a) North (b) South

(c) East (d) West

38. An electron is moving on a circular path of radius *r* with speed *v* in a transverse magnetic field *B*. *e*/*m* for it will be

[MP PMT 2003]

(a) $\frac{v}{Br}$ (b) $\frac{B}{rv}$

(c) *Bvr* (d) $\frac{vr}{B}$

39. A beam of well collimated cathode rays travelling with a speed of $5 \times 10^6 ms^{-1}$ enter a region of mutually perpendicular electric and magnetic fields and emerge undeviated from this region. If $|B| = 0.02\, T$, the magnitude of the electric field is **[Haryana CEE 1996]**

(a) $10^5\ Vm^{-1}$ (b) $2.5\times10^8\ Vm^{-1}$

(c) $1.25\times10^{10}\ Vm^{-1}$ (d) $2\times10^3\ Vm^{-1}$

40. An electron having charge $1.6\times10^{-19}\ C$ and mass $9\times10^{-31}\ kg$ is moving with $4\times10^6\ ms^{-1}$ speed in a magnetic field $2\times10^{-1}\ tesla$ in a circular orbit. The force acting on electron and the radius of the circular orbit will be **[MP PET 1996; JIPMER 2000; BVP 2003]**

(a) $12.8\times10^{-13}\ N, 1.1\times10^{-4}\ m$

(b) $1.28\times10^{-14}\ N, 1.1\times10^{-3}\ m$

(c) $1.28\times10^{-13}\ N, 1.1\times10^{-3}\ m$

(d) $1.28\times10^{-13}\ N, 1.1\times10^{-4}\ m$

41. An electron enters a magnetic field whose direction is perpendicular to the velocity of the electron. Then **[MP PMT 1996; CBSE PMT 2003]**

(a) The speed of the electron will increase

(b) The speed of the electron will decrease

(c) The speed of the electron will remain the same

(d) The velocity of the electron will remain the same

42. An electron is moving in the north direction. It experiences a force in vertically upward direction. The magnetic field at the position of the electron is in the direction of **[MP PET 2003]**

(a) East (b) West

(c) North (d) South

43. A current carrying long solenoid is placed on the ground with its axis vertical. A proton is falling along the axis of the solenoid with a velocity *v*. When the proton enters into the solenoid, it will

(a) Be deflected from its path

(b) Be accelerated along the same path

(c) Be decelerated along the same path

(d) Move along the same path with no change in velocity

44. A charged particle of mass *m* and charge *q* describes circular motion of radius *r* in a uniform magnetic field of strength *B*. The frequency of revolution is **[MP PET 1997; RPET 2001]**

(a) $\frac{Bq}{2\pi m}$ (b) $\frac{Bq}{2\pi rm}$

(c) $\frac{2\pi m}{Bq}$ (d) $\frac{Bm}{2\pi q}$

45. An electron is accelerated by a potential difference of 12000 *volts*. It then enters a uniform magnetic field of $10^{-3}\ T$ applied perpendicular to the path of electron. Find the radius of path. Given mass of electron $=9\times10^{-31}\ kg$ and charge on electron $=1.6\times10^{-19}\ C$ **[MP PET 1997]**

(a) 36.7 *m* (b) 36.7 *cm*

(c) 3.67 *m* (d) 3.67 *cm*

46. The charge on a particle *Y* is double the charge on particle *X*. These two particles *X* and *Y* after being accelerated through the same potential difference enter a region of uniform magnetic field and describe circular paths of radii R_1 and R_2 respectively. The ratio of the mass of *X* to that of *Y* is **[MP PET 1997]**

(a) $\left(\frac{2R_1}{R_2}\right)^2$ (b) $\left(\frac{R_1}{2R_2}\right)^2$

(c) $\frac{R_1^2}{2R_2^2}$ (d) $\frac{2R_1}{R_2}$

47. A particle with $10^{-11}\ coulomb$ of charge and $10^{-7}\ kg$ mass is moving with a velocity of $10^8\ m/s$ along the *y*-axis. A uniform static magnetic field $B=0.5\ Tesla$ is acting along the *x*-direction. The force on the particle is **[MP PMT 1997]**

(a) $5\times10^{-11}\ N$ along $\hat{i}$ (b) $5\times10^3\ N$ along $\hat{k}$

(c) $5\times10^{-11}\ N$ along $-\hat{j}$ (d) $5\times10^{-4}\ N$ along $-\hat{k}$

48. A particle of charge *q* and mass *m* moving with a velocity *v* along the *x*-axis enters the region *x* > 0 with uniform magnetic field *B* along the $\hat{k}$ direction. The particle will penetrate in this region in the *x*-direction upto a distance *d* equal to **[MP PMT 1997]**

(a) Zero (b) $\frac{mv}{qB}$

(c) $\frac{2mv}{qB}$ (d) Infinity

49. A charged particle is moving with velocity v in a magnetic field of induction B. The force on the particle will be maximum when [MP PMT/PET 1998]

(a) v and B are in the same direction
(b) v and B are in opposite directions
(c) v and B are perpendicular
(d) v and B are at an angle of 45°

50. A charged particle enters a magnetic field H with its initial velocity making an angle of 45° with H. The path of the particle will be [MP PET 1999; AIIMS 1999; BHU 1999]

(a) A straight line (b) A circle
(c) An ellipse (d) A helix

51. An electron and a proton enter a magnetic field perpendicularly. Both have same kinetic energy. Which of the following is true [MP PET 1999]

(a) Trajectory of electron is less curved
(b) Trajectory of proton is less curved
(c) Both trajectories are equally curved
(d) Both move on straight-line path

52. A charged particle moves in a uniform magnetic field. The velocity of the particle at some instant makes an acute angle with the magnetic field. The path of the particle will be [MP PMT 1999]

(a) A straight line
(b) A circle
(c) A helix with uniform pitch
(d) A helix with non-uniform pitch

53. An electron is moving along positive x-axis. To get it moving on an anticlockwise circular path in x-y plane, a magnetic filed is applied [MP PMT 1999]

(a) Along positive y-axis (b)Along positive z-axis
(c) Along negative y-axis (d)Along negative z-axis

54. A moving charge will gain energy due to the application of [CPMT 1999]

(a) Electric field (b) Magnetic field
(c) Both of these (d) None of these

55. A proton, a deuteron and an α – particle having the same kinetic energy are moving in circular trajectories in a constant magnetic field. If r_p, r_d and r_α denote respectively the radii of the trajectories of these particles, then [IIT 1997 Re-Exam]

(a) $r_\alpha = r_p < r_d$ (b) $r_\alpha > r_d > r_p$
(c) $r_\alpha = r_d > r_p$ (d) $r_p = r_d = r_\alpha$

56. When a magnetic field is applied in a direction perpendicular to the direction of cathode rays, then their [EAMCET 1994; BHU 2005]

(a) Energy decreases
(b) Energy increases
(c) Momentum increases
(d) Momentum and energy remain unchanged

57. A charge moves in a circle perpendicular to a magnetic field. The time period of revolution is independent of [RPET 1997; AIEEE 2002]

(a) Magnetic field (b) Charge
(c) Mass of the particle (d) Velocity of the particle

58. A proton of energy 200 MeV enters the magnetic field of 5 T. If direction of field is from south to north and motion is upward, the force acting on it will be [RPET 1997]

(a) Zero (b) $1.6 \times 10^{-10}\, N$
(c) $3.2 \times 10^{-8}\, N$ (d) $1.6 \times 10^{-6}\, N$

59. An electron enters a region where magnetic (B) and electric (E) fields are mutually perpendicular to one another, then [CBSE PMT1993]

(a) It will always move in the direction of B
(b) It will always move in the direction of E
(c) It always possess circular motion
(d) It can go undeflected also

60. A charge moving with velocity v in X-direction is subjected to a field of magnetic induction in

the negative X-direction. As a result, the charge will **[CBSE PMT1993]**

(a) Remain unaffected

(b) Start moving in a circular path Y-Z plane

(c) Retard along X-axis

(d) Move along a helical path around X-axis

61. An electron and a proton with equal momentum enter perpendicularly into a uniform magnetic field, then

[BHU 1997; AIEEE 2002; MH CET (Med.) 2000]

(a) The path of proton shall be more curved than that of electron

(b) The path of proton shall be less curved than that of electron

(c) Both are equally curved

(d) Path of both will be straight line

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

[CBSE PMT 1997]

(a) Get deflected vertically upwards

(b) Move in a circular orbit with its speed increased

(c) Move in a circular orbit with its speed unchanged

(d) Continue to move due east

63. A particle moving in a magnetic field increases its velocity, then its radius of the circle

[BHU 1998]

(a) Decreases (b) Increases

(c) Remains the same (d) Becomes half

64. A particle is moving in a uniform magnetic field, then

[BHU 1998]

(a) Its momentum changes but total energy remains the same

(b) Both momentum and total energy remain the same

(c) Both will change

(d) Total energy changes but momentum remains the same

65. If an electron is going in the direction of magnetic field $\vec{B}$ with the velocity of $\vec{v}$ then the force on electron is

[RPMT 1999]

(a) Zero (b) $e(\vec{v} \cdot \vec{B})$

(c) $e(\vec{v} \times \vec{B})$ (d) None of these

66. One proton beam enters a magnetic field of $10^{-4}\,T$ normally, Specific charge = $10^{11}\,C/kg$. velocity = $10^{7}\,m/s$. What is the radius of the circle described by it **[DCE 1999]**

(a) 0.1 m (b) 1 m

(c) 10 m (d) None of these

67. In a cyclotron, the angular frequency of a charged particle is independent of

(a) Mass (b) Speed

(c) Charge (d) Magnetic field

68. A charged particle is moving in a uniform magnetic field in a circular path. Radius of circular path is R. When energy of particle is doubled, then new radius will be

[CPMT 1999; Pb. PET 2002]

(a) $R\sqrt{2}$ (b) $R\sqrt{3}$

(c) 2 R (d) 3 R

69. The radius of curvature of the path of a charged particle moving in a static uniform magnetic field is **[Roorkee 1999]**

(a) Directly proportional to the magnitude of the charge on the particle

(b) Directly proportional to the magnitude of the linear momentum of the particle

(c) Directly proportional to the kinetic energy of the particle

(d) Inversely proportional to the magnitude of the magnetic field

70. A proton moving with a velocity, $2.5 \times 10^{7}\,m/s$, enters a magnetic field of intensity $2.5T$ making an angle 30^{o} with the magnetic field. The force on the proton is

[AFMC 2000; CBSE PMT 2000]

(a) $3 \times 10^{-12}\,N$ (b) $5 \times 10^{-12}\,N$

(c) $6 \times 10^{-12}\,N$ (d) $9 \times 10^{-12}\,N$

71. Maximum kinetic energy of the positive ion in the cyclotron is

(a) $\frac{q^2 B r_0}{2m}$ (b) $\frac{qB^2 r_o}{2m}$

(c) $\frac{q^2B^2r_0^2}{2m}$ (d) $\frac{qBr_0}{2m^2}$

72. A charge q is moving in a magnetic field then the magnetic force does not depend upon

(a) Charge (b) Mass

(c) Velocity (d) Magnetic field

73. An electron is travelling in east direction and a magnetic field is applied in upward direction then electron will deflect in

(a) South (b) North

(c) West (d) East

74. A charge of 1*C* is moving in a magnetic field of 0.5*Tesla* with a velocity of 10*m/sec* Perpendicular to the field. Force experienced is

(a) 5 *N* (b) 10 *N*

(c) 0.5 *N* (d) 0 *N*

75. An electron of mass *m* and charge *q* is travelling with a speed *v* along a circular path of radius *r* at right angles to a uniform of magnetic field *B*. If speed of the electron is doubled and the magnetic field is halved, then resulting path would have a radius of **[Kerala PMT 2004; KCET 2000, 05]**

(a) $\frac{r}{4}$ (b) $\frac{r}{2}$

(c) $2r$ (d) $4r$

76. If an electron enters a magnetic field with its velocity pointing in the same direction as the magnetic field, then **[MP PMT 2000]**

(a) The electron will turn to its right

(b) The electron will turn to its left

(c) The velocity of the electron will increase

(d) The velocity of the electron will remain unchanged

77. A particle of mass *m* and charge *q* enters a magnetic field *B* perpendicularly with a velocity *v*, The radius of the circular path described by it will be **[MP PMT 2000]**

(a) Bq/mv (b) mq/Bv

(c) mB/qv (d) mv/Bq

78. An electron moving towards the east enters a magnetic field directed towards the north. The force on the electron will be directed

(a) Vertically upward (b) Vertically downward

(c) Towards the west (d) Towards the south

[RPET 2000]

79. An electron (mass = 9.0×10^{-31} *kg* and charge = 1.6×10^{-19} *coulomb*) is moving in a circular orbit in a magnetic field of 1.0×10^{-4} $weber/m^2$. Its period of revolution is **[MP PET 2000; Pb PET 2003]**

(a) 3.5×10^{-7} *sec* (b) 7.0×10^{-7} *sec*

[RPET 2000]

(c) 1.05×10^{-6} *sec* (d) 2.1×10^{-6} *sec*

80. An electron (charge *q* coulomb) enters a magnetic field of *H* $weber/m^2$ with a velocity of $v\,m/s$ in the same direction as that of the field the force on the electron is **[MP PET 2000]** **[RPMT 2000]**

(a) *Hqv* Newton's in the direction of the magnetic field

(b) *Hqv* dynes in the direction of the magnetic field

(c) *Hqv* Newton's at right angles to the direction of the magnetic field

(d) Zero

81. A homogeneous electric field *E* and a uniform magnetic field $\vec{B}$ are pointing in the same direction. A proton is projected with its velocity parallel to $\vec{E}$. It will **[Roorkee 2000]**

(a) Go on moving in the same direction with increasing velocity

(b) Go on moving in the same direction with constant velocity

(c) Turn to its right

(d) Turn to its left

82. The radius of circular path of an electron when subjected to a perpendicular magnetic field is **[Pb. PMT 1999; DCE 2000; MH CET (Med.) 2000]**

(a) $\frac{mv}{Be}$ (b) $\frac{me}{Be}$

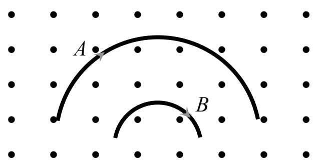
(c) $\frac{mE}{Be}$ (d) $\frac{Be}{mv}$

83. Cyclotron is used to accelerate **[AIIMS 2001; BCECE 2004]**

(a) Electrons (b) Neutrons

(c) Positive ions (d) Negative ions

84. Two particles *A* and *B* of masses m_A and m_B respectively and having the same charge are moving in a plane. A uniform magnetic field **[MP PET 2000]** exists perpendicular to this plane. The speeds of the particles are v_A and v_B respectively, and the trajectories are as shown in the figure. Then **[IIT-JEE (Screening) 2001]**



(a) $m_A v_A < m_B v_B$

(b) $m_A v_A > m_B v_B$

(c) $m_A < m_B$ and $v_A < v_B$

(d) $m_A = m_B$ and $v_A = v_B$

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

(a) 1 (b) $\frac{1}{2}$

(c) 2 (d) $\frac{1}{4}$

86. A particle of mass 0.6 *g* and having charge of 25 *nC* is moving horizontally with a uniform velocity $1.2 \times 10^4 \, ms^{-1}$ in a uniform magnetic field, then the value of the magnetic induction is $(g = 10 \, ms^{-2})$ **[EAMCET 2001]**

(a) Zero (b) 10 *T*

(c) 20 *T* (d) 200 *T*

87. An α particle and a proton travel with same velocity in a magnetic field perpendicular to the direction of their velocities, find the ratio of the radii of their circular path **[AIIMS 2004; DCE 2001, 03; Kerala PMT 2005]**

(a) 4 : 1 (b) 1 : 4

(c) 2 : 1 (d) 1 : 2

88. Motion of a moving electron is not affected by **[AMU (Engg.) 2001]**

(a) An electric field applied in the direction of motion

(b) Magnetic field applied in the direction of motion

(c) Electric field applied perpendicular to the direction of motion

(d) Magnetic field applied perpendicular to the direction of motion

89. When a charged particle enters a uniform magnetic field its kinetic energy **[MP PMT 2001; MP PET 20**

(a) Remains constant (b) Increases

(c) Decreases (d) Becomes zero

90. If cathode rays are projected at right angles to a magnetic field, their trajectory is

(a) Ellipse (b) Circle

(c) Parabola (d) None of these

91. At a specific instant emission of radioactive compound is deflected in a magnetic field. The compound can emit

(i) Electrons (ii) Protons

(iii) He^{2+} (iv)

The emission at the instant can be **[MP PET 2001]**

(a) i, ii, iii (b) i, ii, iii, iv

(c) iv (d) ii, iii

92. Which particles will have minimum frequency of revolution when projected with the same velocity perpendicular to a magnetic field

(a) Li^+ (b) Electron

(c) Proton (d) He^+

93. Mixed He^+ and O^{2+} ions (mass of $He^+ = 4 \, amu$ and that of $O^{2+} = 16 \, amu$) beam passes a region of constant perpendicular magnetic field. If kinetic energy of all the ions is same then

(a) He^+ ions will be deflected more than those of O^{2+}

(b) He^+ ions will be deflected less than those of O^{2+}

(c) All the ions will be deflected equally

(d) No ions will be deflected

94. An electron (mass = $9 \times 10^{-31} kg$. Charge = $1.6 \times 10^{-19} C$) whose kinetic energy is 7.2×10^{-18} *joule* is moving in a circular orbit in a magnetic field of 9×10^{-5} *weber/m*^{2}. The radius of the orbit is **[MP PMT 2002]**

(a) 1.25 *cm* (b) 2.5 *cm*

(c) 12.5 *cm* (d) 25.0 *cm*

95. An electron enters a region where electrostatic field is 20*N*/*C* and magnetic field is 5*T*. If electron passes undeflected through the region, then velocity of electron will be

[DPMT 2002]

(a) $0.25 ms^{-1}$ (b) $2 ms^{-1}$

(c) $4 ms^{-1}$ (d) $8 ms^{-1}$

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

[IIT-JEE 1999; DPMT 2000; UPSEAT 2003]

(a) Straight line (b) Circle

(c) Helix (d) Cycloid

97. A particle of mass M and charge Q moving with velocity $\vec{v}$ describes a circular path of radius R when subjected to a uniform transverse magnetic field of induction B. The work done by the field when the particle completes one full circle is

(a) $BQv2\pi R$ (b) $\left(\frac{Mv^2}{R}\right)2\pi R$

(c) Zero (d) $BQ2\pi R$

98. A particle of charge -16×10^{-18} *coulomb* moving with velocity $10\ ms^{-1}$ along the x-axis enters a region where a magnetic field of induction B is along the y-axis, and an electric field of magnitude $10^4\ V/m$ is along the negative z-axis. If the charged particle continues moving along the x-axis, the magnitude of B is

(a) $10^{-3}\ Wb/m^2$ (b) $10^{3}\ Wb/m^2$

(c) $10^{5}\ Wb/m^2$ (d) $10^{16}\ Wb/m^2$

99. Two ions having masses in the ratio 1 : 1 and charges 1 : 2 are projected into uniform magnetic field perpendicular to the field with speeds in the ratio 2 : 3. The ratio of the radii of circular paths along which the two particles move is

[EAMCET 2003]

(a) 4 : 3 (b) 2 : 3

(c) 3 : 1 (d) 1 : 4

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

(a) Straight line along the x-direction

(b) A circle in the xz-plane

(c) A circle in the yz-plane

(d) A circle in the xy-plane

101. An electron and a proton have equal kinetic energies. They enter in a magnetic field perpendicularly, Then

[UPSEAT 2003]

(a) Both will follow a circular path with same radius

(b) Both will follow a helical path

(c) Both will follow a parabolic path

(d) All the statements are false

102. Electrons move at right angles to a magnetic field of 1.5×10^{-2} *Tesla* with a speed of $6 \times 10^7\ m/s$. If the specific charge of the electron is $1.7 \times 10^{11}\ C/kg$. The radius of the circular path will be

[AIEEE 2003] **[BHU 2003]**

(a) 2.9 *cm* (b) 3.9 *cm*

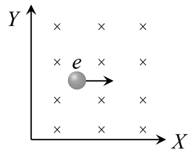
(c) 2.35 *cm* (d) 3 *cm*

103. The cyclotron frequency of an electron grating in a magnetic field of 1 T is approximately

(a) 28 *MHz* (b) 280 *MHz*

(c) 2.8 *GHz* (d) 28 *GHz*

104. In the given figure, the electron enters into the magnetic field. It deflects in ...... direction



(a) + *ve X* direction

(b) – *ve X* direction **[AFMC 2003]**

(c) + *ve Y* direction

(d) – *ve Y* direction

105. A proton of energy 8 eV is moving in a circular path in a uniform magnetic field. The energy of an alpha particle moving in the same magnetic field and along the same path will be

(a) 4 eV (b) 2 eV

(c) 8 eV (d) 6 eV

106. An electron, a proton, a deuteron and an alpha particle, each having the same speed are in a region of constant magnetic field perpendicular to the direction of the velocities of the particles. The radius of the circular orbits of these

[AIIMS 2003]

particles are respectively R_e, R_p, R_d and R_α. It follows that

(a) $R_e = R_p$ (b) $R_p = R_d$

(c) $R_d = R_\alpha$ (d) $R_p = R_\alpha$

107. An electron moving with a uniform velocity along the positive x-direction enters a magnetic field directed along the positive y-direction. The force on the electron is directed along

(a) Positive y-direction (b) Negative y-direction

(c) Positive z-direction (d) Negative z-direction

108. An electron is projected along the axis of a circular conductor carrying some current. Electron will experience force

(a) Along the axis

(b) Perpendicular to the axis

(c) At an angle of 4° with axis

(d) No force experienced

109. A very high magnetic field is applied to a stationary charge. Then the charge experiences

(a) A force in the direction of magnetic field

(b) A force perpendicular to the magnetic field

(c) A force in an arbitrary direction

(d) No force

110. A electron ($q = 1.6 \times 10^{-19}$ C) is moving at right angle to the uniform magnetic field 3.534×10^{-5} T. The time taken by the electron to complete a circular orbit is **[MH CET 2004]**

(a) 2 μs (b) 4 μs

(c) 3 μs (d) 1 μs

111. In case Hall effect for a strip having charge Q and area of cross-section A, the Lorentz force is **[DCE 2004]**

(a) Directly proportional to Q

(b) Inversely proportional to Q

(c) Inversely proportional to A

(d) Directly proportional to A

112. A charged particle of mass m and charge q travels on a circular path of radius r that is perpendicular to a magnetic field B. The time taken by the particle to complete one revolution is **[AIEEE 2005]**

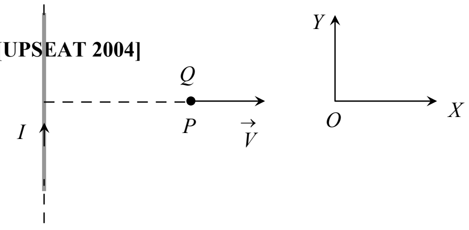
(a) $\frac{2\pi qB}{m}$ (b) $\frac{2\pi m}{qB}$

[UPSEAT 2004]

(c) $\frac{2\pi mq}{B}$ (d) $\frac{2\pi q^2 B}{m}$

113. A very long straight wire carries a current I. At the instant when a charge $+Q$ at point P has velocity $\vec{V}$, as shown, the force on the charge is

[UPSEAT 2004]



[DCE 2002]

(a) Opposite to OX (b) Along OX

(c) Opposite to OY (d) Along OY

114. The electron in the beam of a television tube move horizontally from south to north. The vertical component of the earth's magnetic field points down. The electron is deflected towards **[DCE 2004]**

(a) West (b) No deflection

(c) East (d) North to south

115. 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 **[CBSE PMT 2005]**

(a) $\frac{B}{v}$ (b) $\frac{v}{R}$

(c) $\sqrt{\frac{v}{B}}$ (d) $\sqrt{\frac{B}{v}}$

116. An electric field of 1500 V/m and a magnetic field of 0.40 $weber/meter^2$ act on a moving electron. The minimum uniform speed along a straight line the electron could have is

(a) 1.6×10^{15} m/s (b) 6×10^{-16} m/s

(c) 3.75×10^3 m/s (d) 3.75×10^2 m/s

117. An electron (mass = 9.1×10^{-31} kg; charge = 1.6×10^{-19} C) experiences no deflection if subjected to an electric field of 3.2×10^5 V/m, and a magnetic fields of 2.0×10^{-3} Wb/m^2. Both the fields are normal to the path of electron and to each other. If the electric field is removed, then the electron will revolve in an orbit of radius

(a) 45 m (b) 4.5 m

(c) 0.45 *m* (d) 0.045 *m*

118. An electron, moving in a uniform magnetic field of induction of intensity $\vec{B}$, has its radius directly proportional to

[DPMT 2005]

(a) Its charge (b) Magnetic field

(c) Speed (d) None of these

Force and Torque on a Current Carrying Conductor

1. Two free parallel wires carrying currents in opposite direction

[CPMT 1977; MP PMT 1993; AFMC 2002; CPMT 2003]

(a) Attract each other

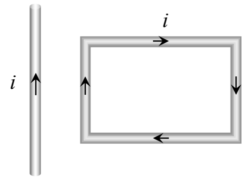
(b) Repel each other

(c) Neither attract nor repel

(d) Get rotated to be perpendicular to each other

2. A rectangular loop carrying a current *i* is situated near a long straight wire such that the wire is parallel to the one of the sides of the loop and is in the plane of the loop. If a steady current *I* is established in wire as shown in figure, the loop will

[IIT 1985; MP PET 1995; MP PMT 1995, 99; AIIMS 2003]



(a) Rotate about an axis parallel to the wire

(b) Move away from the wire or towards right

(c) Move towards the wire

(d) Remain stationary

3. A circular coil of radius 4 *cm* and of 20 turns carries a current of 3 *amperes*. It is placed in a magnetic field of intensity of 0.5 $weber/m^2$. The magnetic dipole moment of the coil is

[MP PMT 2001]

(a) 0.15 $ampere-m^2$ (b) 0.3 $ampere-m^2$

(c) 0.45 $ampere-m^2$ (d) 0.6 $ampere-m^2$

4. A conducting circular loop of radius *r* carries a constant current *i*. It is placed in a uniform magnetic field $\vec{B}$, such that $\vec{B}$ is perpendicular to the plane of the loop. The magnetic force acting on the loop is

[BIT 1992; MP PET 1994; IIT 1983; MP PMT 1999; AMU (Engg.) 2000]

(a) $ir\vec{B}$ (b) $2\pi ri\vec{B}$

(c) Zero (d) $\pi ri\vec{B}$

5. Two thin long parallel wires separated by a distance *b* are carrying a current *i amp* each. The magnitude of the force per unit length exerted by one wire on the other is

[CPMT 1991; IIT 1986; Bihar MEE 1995; RPMT 1997; MP PET 1996; MP PMT 1994, 96, 99; UPSEAT 2001, 03]

(a) $\frac{\mu_0 i^2}{b^2}$ (b) $\frac{\mu_0 i^2}{2\pi b}$

(c) $\frac{\mu_0 i}{2\pi b}$ (d) $\frac{\mu_0 i}{2\pi b^2}$

6. Through two parallel wires *A* and *B*, 10 and 2 *ampere* of currents are passed respectively in opposite direction. If the wire *A* is infinitely long and the length of the wire *B* is 2 *m*, the force on the conductor *B*, which is situated at 10 *cm* distance from *A* will be **[CPMT 1988; MP PMT 1994]**

(a) $8\times10^{-5}N$ (b) $4\times10^{-7}N$

(c) $4\times10^{-5}N$ (d) $4\pi\times10^{-7}N$

7. If two streams of protons move parallel to each other in the same direction, then they **[MP PET 1999; AIIMS 2004]**

(a) Do not exert any force on each other

(b) Repel each other

(c) Attract each other

(d) Get rotated to be perpendicular to each other

8. A straight wire carrying a current i_1 *amp* runs along the axis of a circular current i_2 *amp*. Then the force of interaction between the two current carrying conductors is

(a) ∞ (b) Zero

(c) $\frac{\mu_0}{4\pi}\frac{2i_1i_2}{r}N/m$ (d) $\frac{2i_1i_2}{r}N/m$

9. Two parallel wires are carrying electric currents of equal magnitude and in the same direction. They exert

[CPMT 1990; MP PET/PMT 1988; Orissa JEE 2003; AFMC 2003]

(a) An attractive force on each other
(b) A repulsive force on each other
(c) No force on each other
(d) A rotational torque on each other

10. Two long and parallel wires are at a distance of 0.1 *m* and a current of 5 *A* is flowing in each of these wires. The force per unit length due to these wires will be **[CPMT 1977]**

(a) $5\times10^{-5}\ N/m$ (b) $5\times10^{-3}\ N/m$
(c) $2.5\times10^{-5}\ N/m$ (d) $2.5\times10^{-4}\ N/m$

11. Two straight parallel wires, both carrying 10 *ampere* in the same direction attract each other with a force of $1\times10^{-3}N$. If both currents are doubled, the force of attraction will be **[MP PET 1994]**

(a) $1\times10^{-3}\ N$ (b) $2\times10^{-3}\ N$
(c) $4\times10^{-3}\ N$ (d) $0.25\times10^{-3}\ N$

12. A circular coil of radius 4 *cm* has 50 turns. In this coil a current of 2 *A* is flowing. It is placed in a magnetic field of 0.1 $weber/m^2$. The amount of work done in rotating it through 180° from its equilibrium position will be **[CPMT 1977]**

(a) 0.1 *J* (b) 0.2 *J*
(c) 0.4 *J* (d) 0.8 *J*

13. 3 *A* of current is flowing in a linear conductor having a length of 40 *cm*. The conductor is placed in a magnetic field of strength 500 *gauss* and makes an angle of 30° with the direction of the field. It experiences a force of magnitude **[MP PET 1993]**

(a) 3×10^{4} *newton* (b) 3×10^{2} *newton*
(c) 3×10^{-2} *newton* (d) 3×10^{-4} *newton*

14. The radius of a circular loop is *r* and a current *i* is flowing in it. The equivalent magnetic moment will be **[CPMT 1990]**

(a) ir (b) $2\pi ir$
(c) $i\pi r^2$ (d) $\frac{1}{r^2}$

15. A current carrying loop is placed in a uniform magnetic field. The torque acting on it does not depend upon **[CPMT 1985; RPMT 1997; Kerala PMT 2002]**

(a) Shape of the loop (b) Area of the loop
(c) Value of the current (d) Magnetic field

16. To make the field radial in a moving coil galvanometer **[MP PET 1993]**

(a) The number of turns in the coil is increased
(b) Magnet is taken in the form of horse-shoe
(c) Poles are cylindrically cut
(d) Coil is wounded on aluminium frame

17. The deflection in a moving coil galvanometer is **[MP PMT 1993]**

(a) Directly proportional to the torsional constant
(b) Directly proportional to the number of turns in the coil
(c) Inversely proportional to the area of the coil
(d) Inversely proportional to the current flowing

18. A moving coil sensitive galvanometer gives at once much more deflection. To control its speed of deflection **[MP PET 1985]**

(a) A high resistance is to be connected across its terminals
(b) A magnet should be placed near the coil
(c) A small copper wire should be connected across its terminals
(d) The body of galvanometer should be earthed

19. In a moving coil galvanometer, the deflection of the coil θ is related to the electrical current *i* by the relation **[MP PMT 1996, 2000, 03; RPMT 1997; CPMT 1975; MP PET 1999]**

(a) $i\propto\tan\theta$ (b) $i\propto\theta$
(c) $i\propto\theta^2$ (d) $i\propto\sqrt{\theta}$

20. The unit of electric current "*ampere*" is the current which when flowing through each of two parallel wires spaced 1 *m* apart in vacuum and of infinite length will give rise to a force between them equal to **[BIT 1987; CBSE PMT1998; MP PET 1999; MP PMT 2002]**

(a) $1\ N/m$ (b) $2\times10^{-7}\ N/m$
(c) $1\times10^{-2}\ N/m$ (d) $4\pi\times10^{-7}\ N/m$

21. A moving coil galvanometer has N number of turns in a coil of effective area A, it carries a current I. The magnetic field B is radial. The torque acting on the coil is [MP PMT 1994]
(a) NA^2B^2I (b) $NABI^2$
(c) N^2ABI (d) $NABI$

22. A small coil of N turns has an effective area A and carries a current I. It is suspended in a horizontal magnetic field $\vec{B}$ such that its plane is perpendicular to $\vec{B}$. The work done in rotating it by 180° about the vertical axis is [MP PMT 1994]
(a) $NAIB$ (b) $2NAIB$
(c) $2\pi NAIB$ (d) $4\pi NAIB$

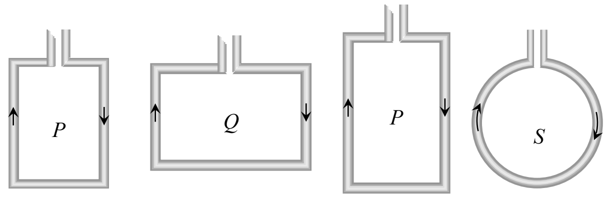
23. A small coil of N turns has area A and a current I flows through it. The magnetic dipole moment of this coil will be [MP PMT 1994]
(a) NI/A (b) NI^2A
(c) N^2AI (d) NIA

24. A current of 10 *ampere* is flowing in a wire of length 1.5 *m*. A force of 15 *N* acts on it when it is placed in a uniform magnetic field of 2 *tesla*. The angle between the magnetic field and the direction of the current is [MP PMT 1994]
(a) 30° (b) 45°
(c) 60° (d) 90°

25. A rectangular loop carrying a current i is placed in a uniform magnetic field B. The area enclosed by the loop is A. If there are n turns in the loop, the torque acting on the loop is given by [MP PMT 1994]
(a) $ni\vec{A}\times\vec{B}$ (b) $ni\vec{A}\cdot\vec{B}$
(c) $\frac{1}{n}(i\vec{A}\times\vec{B})$ (d) $\frac{1}{n}(i\vec{A}\cdot\vec{B})$

26. An electron moves with a constant speed v along a circle of radius r. Its magnetic moment will be (e is the electron's charge) [MP PMT 1994]
(a) evr (b) $\frac{1}{2}evr$
(c) $\pi r^2 ev$ (d) $2\pi rev$

27. Four wires each of length 2.0 *metres* are bent into four loops P, Q, R and S and then suspended into uniform magnetic field. Same current is passed in each loop. Which statement is correct [MP PET 1995; DPMT 1999]



(a) Couple on loop P will be the highest
(b) Couple on loop Q will be the highest
(c) Couple on loop R will be the highest
(d) Couple on loop S will be the highest

28. A current carrying rectangular coil is placed in a uniform magnetic field. In which orientation, the coil will not tend to rotate [MP PMT 1995]
(a) The magnetic field is parallel to the plane of the coil
(b) The magnetic field is perpendicular to the plane of the coil
(c) The magnetic field is at 45° with the plane of the coil
(d) Always in any orientation

29. A current carrying circular loop is freely suspended by a long thread. The plane of the loop will point in the direction [MP PMT 1995]
(a) Wherever left free
(b) North-south
(c) East-west
(d) At 45° with the east-west direction

30. A current carrying loop is free to turn in a uniform magnetic field. The loop will then come into equilibrium when its plane is inclined at [CBSE PMT 1992; Haryana CEE 1996]
(a) 0° to the direction of the field
(b) 45° to the direction of the field
(c) 90° to the direction of the field
(d) 135° to the direction of the field

31. The expression for the torque acting on a coil having area of cross-section A, number of turns n, placed in a magnetic field of strength B,

making an angle θ with the normal to the plane of the coil, when a current i is flowing in it, will be

[MP PET 1996]

(a) $niAB\tan\theta$ (b) $niAB\cos\theta$

(c) $niAB\sin\theta$ (d) $niAB$

32. The pole pieces of the magnet used in a pivoted coil galvanometer are **[MP PET 1996]**

(a) Plane surfaces of a bar magnet

(b) Plane surfaces of a horse-shoe magnet

(c) Cylindrical surfaces of a bar magnet

(d) Cylindrical surfaces of a horse-shoe magnet

33. The sensitiveness of a moving coil galvanometer can be increased by decreasing

[MP PMT 1996]

(a) The number of turns in the coil

(b) The area of the coil

(c) The magnetic field

(d) The couple per unit twist of the suspension

34. A metallic loop is placed in a magnetic field. If a current is passed through it, then

[UPSEAT 2003]

(a) The ring will feel a force of attraction

(b) The ring will feel a force of repulsion

(c) It will move to and fro about its centre of gravity

(d) None of these

35. Two parallel conductors *A* and *B* of equal lengths carry currents I and 10 I, respectively, in the same direction. Then

[MP PET 2003]

(a) *A* and *B* will repel each other with same force

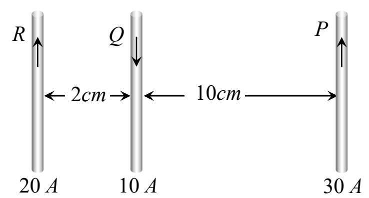
(b) *A* and *B* will attract each other with same force

(c) A will attract *B*, but *B* will repel *A*

(d) *A* and *B* will attract each other with different forces

36. Three long, straight and parallel wires carrying currents are arranged as shown in figure. The force experienced by 10 *cm* length of wire *Q* is

[MP PET 1997]



(a) $1.4\times10^{-4}\,N$ towards the right

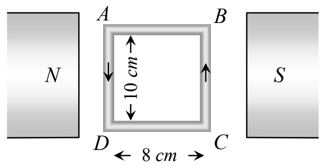
(b) $1.4\times10^{-4}\,N$ towards the left

(c) $2.6\times10^{-4}\,N$ to the right

(d) $2.6\times10^{-4}\,N$ to the left

37. A 100 turns coil shown in figure carries a current of 2 *amp* in a magnetic field $B = 0.2\,Wb/m^2$. The torque acting on the coil is

[MP PET 1997]



(a) 0.32 *Nm* tending to rotate the side *AD* out of the page

(b) 0.32 *Nm* tending to rotate the side *AD* into the page

(c) 0.0032 *Nm* tending to rotate the side *AD* out of the page

(d) 0.0032 *Nm* tending to rotate the side *AD* into the page

38. A current of 5 *ampere* is flowing in a wire of length 1.5 *metres*. A force of 7.5 *N* acts on it when it is placed in a uniform magnetic field of 2 *Tesla*. The angle between the magnetic field and the direction of the current is

[MP PET 1997; Pb. PET 2003]

(a) $30°$ (b) 45°

(c) 60° (d) 90°

39. A conductor in the form of a right angle *ABC* with *AB* = 3 *cm* and *BC* = 4 *cm* carries a current of 10 *A*. There is a uniform magnetic field of 5 *T* perpendicular to the plane of the conductor. The force on the conductor will be

[MP PMT 1997]

(a) 1.5 *N* (b) 2.0 *N*

(c) 2.5 *N* (d) 3.5 *N*

40. The coil of a galvanometer consists of 100 turns and effective area of 1 *square cm*. The restoring couple is $10^{-8}\ N-m/radian$. The magnetic field between the pole pieces is 5 *T*. The current sensitivity of this galvanometer will be

[MP PMT 1997]

(a) $5\times10^{4}\ rad/\mu\, amp$ (b) $5\times10^{-6}\ per\, amp$

(c) $2\times10^{-7}\ per\, amp$ (d) $5\ rad/\mu\, amp$

41. A rectangular coil $20\, cm\times20\, cm$ has 100 turns and carries a current of 1 *A*. It is placed in a uniform magnetic field *B* =0.5 *T* with the direction of magnetic field parallel to the plane of the coil. The magnitude of the torque required to hold this coil in this position is

[MP PMT 1997]

(a) Zero (b) 200 *N-m*

(c) 2 *N-m* (d) 10 *N-m*

42. If a current is passed in a spring, it

[MP PMT/PET 1998; AIEEE 2002]

(a) Gets compressed (b) Gets expanded

(c) Oscillates (d) Remains unchanged

43. A current carrying small loop behaves like a small magnet. If *A* be its area and *M* its magnetic moment, the current in the loop will be

[MP PMT/PET 1998; RPET 2001; MP PMT 2003]

(a) M/A (b) A/M

(c) MA (d) A^2M

44. In hydrogen atom, the electron is making $6.6\times10^{15}\ rev/\sec$ around the nucleus in an orbit of radius 0.528 $\mathring{A}$. The magnetic moment $(A-m^2)$ will be

[MP PET 1999]

(a) 1×10^{-15} (b) 1×10^{-10}

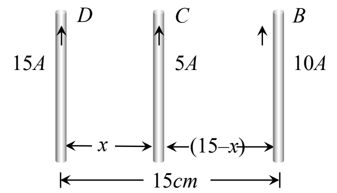
(c) 1×10^{-23} (d) 1×10^{-27}

45. A triangular loop of side *l* carries a current *I*. It is placed in a magnetic field *B* such that the plane of the loop is in the direction of *B*. The torque on the loop is **[MP PET 2003]**

(a) Zero (b) *IBl*

(c) $\frac{\sqrt{3}}{2}Il^2B^2$ (d) $\frac{\sqrt{3}}{4}IBl^2$

46. Three long, straight and parallel wires carrying currents are arranged as shown in the figure. The wire *C* which carries a current of 5.0 *amp* is so placed that it experiences no force. The distance of wire *C* from wire *D* is then **[AMU 1995]**



(a) 9 *cm*

(b) 7 *cm*

(c) 5 *cm*

(d) 3 *cm*

47. A vertical wire carrying a current in the upward direction is placed in horizontal magnetic field directed towards north. The wire will experience a force directed towards

[SCRA 1994]

(a) North (b) South

(c) East (d) West

48. A coil carrying electric current is placed in uniform magnetic field, then

[CBSE PMT 1993]

(a) Torque is formed

(b) E.M.f. is induced

(c) Both (a) and (b) are correct

(d) None of these

49. A circular loop carrying a current is replaced by an equivalent magnetic dipole. A point on the axis of the loop is

[MNR 1998]

(a) An end-on position (b) A broad side-on position

(c) Both (a) and (b) (d) Neither (a) nor (b)

50. A power line lies along the east-west direction and carries a current of 10 *ampere*. The force per metre due to the earth's magnetic field of $10^{-4}\ tesla$ is **[Roorkee 1992]**

(a) $10^{-5}\ N$ (b) $10^{-4}\ N$

(c) $10^{-3}\ N$ (d) $10^{-2}\ N$

51. A straight wire of length 0.5 *metre* and carrying a current of 1.2 *ampere* placed in a uniform magnetic field of induction 2 *Tesla*. The magnetic field is perpendicular to the length of the wire. The force on the wire is

[CBSE PMT 1992; BHU 1998; DPMT 2001; RPET 2003]

(a) 2.4 *N* (b) 1.2 *N*

(c) 3.0 *N* (d) 2.0 *N*

52. Two parallel wires in free space are 10 *cm* apart and each carries a current of 10 *A* in the same direction. The force one wire exerts on the other per metre of length is

[CBSE PMT 1997; AFMC 1999]

(a) $2\times10^{-4}\,N$, attractive (b) $2\times10^{-4}\,N$, repulsive

(c) $2\times10^{-7}\,N$, attractive (d) $2\times10^{-7}\,N$, repulsive

53. The current sensitivity of a moving coil galvanometer can be increased by

(a) Increasing the magnetic field of the permanent magnet

(b) Increasing the area of the deflecting coil

(c) Increasing the number of turns in the coil

(d) Increasing the restoring couple of the coil

54. A circular coil of diameter 7*cm* has 24 turns of wire carrying current of 0.75*A*. The magnetic moment of the coil is

[AMU (Med.) 1999]

(a) $6.9\times10^{-2}\,amp-m^2$ (b) $2.3\times10^{-2}\,amp-m^2$

(c) $10^{-2}\,amp-m^2$ (d) $10^{-3}\,amp-m^2$

55. Two long parallel wires carrying equal current separated by 1*m,* exert a force of $2\times10^{-7}\,N/m$ on one another. The current flowing through them is [AMU (Engg.) 1999]

(a) 2.0 *A* (b) $2.0\times10^{-7}\,A$

(c) 1.0 *A* (d) $1.0\times10^{-7}\,A$

56. Two parallel beams of electrons moving in the same direction produce a mutual force

(a) Of attraction in plane of paper

(b) Of repulsion in plane of paper

(c) Upwards perpendicular to plane of paper

(d) Downwards perpendicular to plane of paper

57. A circular loop of area $0.01\,m^2$ carrying a current of 10 *A,* is held perpendicular to a magnetic field of intensity 0.1*T.* The torque acting on the loop is [Pb. PMT 2000]

(a) Zero (b) 0.01 *N-m*

(c) 0.001 *N-m* (d) 0.8 *N-m*

58. Magnetic dipole moment of a rectangular loop is

[RPET 2000]

(a) Inversely proportional to current in loop

(b) Inversely proportional to area of loop

(c) Parallel to plane of loop and proportional to area of loop

(d) Perpendicular to plane of loop and proportional to area of loop

59. If *m* is magnetic moment and *B* is the magnetic field, then the torque is given by

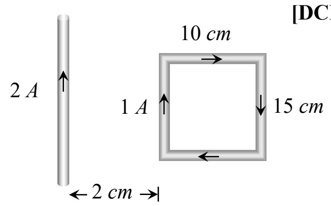
[Roorkee 1999]

(a) $\vec{m}.\vec{B}$ (b) $\dfrac{|\vec{m}|}{|\vec{B}|}$

(c) $\vec{m}\times\vec{B}$ (d) $|\vec{m}|.|\vec{B}|$

60. What is the net force on the square coil

[DCE 2000; RPMT 2000]



(a) $25\times10^{-7}\,N$ moving towards wire

(b) $25\times10^{-7}\,N$ moving away from wire

(c) $35\times10^{-7}\,N$ moving towards wire

(d) $35\times10^{-7}\,N$ moving away from wire

61. Two long parallel copper wires carry currents of 5*A* each in opposite directions. If the wires are separated by a distance of 0.5*m,* then the force between the two wires is

[EAMCET (Engg.) 2000]

[MP PET 1996; DCE 1999]

(a) $10^{-5}\,N$, attractive (b) $10^{-5}\,N$, repulsive

(c) $2\times10^{-5}\,N$, attractive (d) $2\times10^{-5}\,N$, repulsive

62. In order to increase the sensitivity of a moving coil galvanometer, one should decrease [MP PMT 2000]

(a) The strength of its magnet

(b) The torsional constant of its suspension

(c) The number of turns in its coil

(d) The area of its coil

63. A circular loop has a radius of 5 *cm* and it is carrying a current of 0.1 *amp*. Its magnetic moment is [MP PMT 2000]

(a) 1.32×10^{-4} *amp* $- m^2$

(b) 2.62×10^{-4} *amp*- m^2

(c) 5.25×10^{-4} *amp*- m^2

(d) 7.85×10^{-4} *amp*- m^2

64. Due to the flow of current in a circular loop of radius *R,* the magnetic induction produced at the centre of the loop is *B*. The magnetic moment of the loop is

(μ_0 = permeability constant) **[MP PET 2000]**

(a) $BR^3 / 2\pi\mu_0$ (b) $2\pi BR^3 / \mu_0$

(c) $BR^2 / 2\pi\mu_0$ (d) $2\pi BR^2 / \mu_0$

65. The magnetic moment of a circular coil carrying current is **[MP PET 2000]**

(a) Directly proportional to the length of the wire in the coil

(b) Inversely proportional to the length of the wire in the coil

(c) Directly proportional to the square of the length of the wire in the coil

(d) Inversely proportional to the square of the length of the wire in the coil

66. A long wire *A* carries a current of 10 *amp*. Another long wire *B,* Which is parallel to *A* and separated by 0.1*m* from *A,* carries a current of 5 *amp*, in the opposite direction to that in *A*. what is the magnitude and nature of the force experienced per unit length of *B*

($\mu_0 = 4\pi \times 10^{-7}$ *weber*/ *amp*- *m*) **[MP PET 2000]**

(a) Repulsive force of 10^{-4} N/m

(b) Attractive force of 10^{-4} N/m

(c) Repulsive force of $2\pi \times 10^{-5}$ N/m

(d) Attractive force of $2\pi \times 10^{-5}$ N/m

67. A stream of electrons is projected horizontally to the right. A straight conductor carrying a current is supported parallel to electron stream and above it. If the current in the conductor is from left to right then what will be the effect on electron stream **[Roorkee 2000]**

(a) The electron stream will be pulled upward

(b) The electron stream will be pulled downward

(c) The electron stream will be retarted

(d) The electron beam will be speeded up towards the right

68. The relation between voltage sensitivity (σ_V) and current sensitivity (σ_i) of a moving coil galvanometer is (Resistance of Galvanometer = *G*) **[CPMT 2001]**

(a) $\frac{\sigma_i}{G} = \sigma_V$ (b) $\frac{\sigma_V}{G} = \sigma_i$

(c) $\frac{G}{\sigma_V} = \sigma_i$ (d) $\frac{G}{\sigma_i} = \sigma_V$

69. What is shape of magnet in moving coil galvanometer to make the radial magnetic field

(a) Concave (b) Horse shoe magnet

(c) Convex (d) None of these

70. If a wire of length 1 *meter* placed in uniform magnetic field 1.5 *Tesla* at angle 30^o with magnetic field. The current in a wire 10 *amp.* Then force on a wire will be **[RPET 2001]**

(a) 7.5 *N* (b) 1.5 *N*

(c) 0.5 *N* (d) 2.5 *N*

71. A current *i* flows in a circular coil of radius *r*. If the coil is placed in a uniform magnetic field *B* with its plane parallel to the field, magnitude of the torque that acts on the coil is **[MP PET 2001]**

(a) Zero (b) $2\pi r i B$

(c) $\pi r^2 iB$ (d) $2\pi r^2 iB$

72. An arbitrary shaped closed coil is made of a wire of length *L* and a current *I* ampere is flowing in it. If the plane of the coil is perpendicular to magnetic field $\vec{B}$, the force on the coil is **[MP PMT 2001]**

(a) Zero (b) *IBL*

(c) 2*IBL* (d) $\frac{1}{2} IBL$

73. A circular coil having *N* turns is made from a wire of length *L* meter. If a current *I* ampere is passed through it and is placed in a magnetic field of *B Tesla*, the maximum torque on it is

(a) Directly proportional to *N*

(b) Inversely proportional to *N*

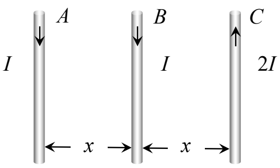
(c) Inversely proportional to N^2

(d) Independent of N

74. A small cylindrical soft iron piece is kept in a galvanometer so that **[MP PMT 2001]**

(a) A radial uniform magnetic field is produced
(b) A uniform magnetic field is produced
(c) There is a steady deflection of the coil
(d) All of these

75. A, B and C are parallel conductors of equal length carrying currents I, I and $2I$ respectively. Distance between A and B is x. Distance between B and C is also x. F_1 *is* the force exerted by B on A and F_2 is the force exerted by B on A choose the correct answer



(a) $F_1 = 2F_2$
(b) $F_2 = 2F_1$
(c) $F_1 = F_2$
(d) $F_1 = -F_2$

76. A straight conductor carries a current of 5A. An electron travelling with a speed of $5\times10^6\, ms^{-1}$ parallel to the wire at a distance of 0.1m from the conductor, experiences a force of **[Kerala PET 2001]**

(a) $8\times10^{-20}\, N$ (b) $3.2\times10^{-19}\, N$
(c) $8\times10^{-18}\, N$ (d) $1.6\times10^{-19}\, N$

77. Two galvanometers A and B require 3mA and 5mA respectively to produce the same deflection of 10 divisions. Then

(a) A is more sensitive than B
(b) B is more sensitive than A
(c) A and B are equally sensitive
(d) Sensitiveness of B is 5/3 times that of A

78. Two long straight parallel conductors separated by a distance of 0.5m carry currents of 5A and 8A in the same direction. The force per unit length experienced by each other is

(a) $1.6\times10^{-5}\, N$ (attractive) (b) $1.6\times10^{-5}\, N$ (repulsive)
(c) $16\times10^{-5}\, N$ (attractive) (d) $16\times10^{-5}\, N$ (repulsive)

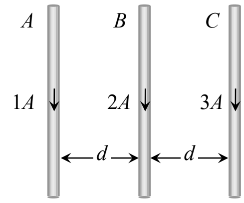
79. If the current is doubled, the deflection is also doubled in **[Orissa JEE 2002]**

(a) A tangent galvanometer
(b) A moving coil galvanometer
(c) Both (a) and (b)
(d) None of these

80. Which is a vector quantity

(a) Density (b) Magnetic flux
(c) Intensity of magnetic field (d)

81. There long straight wires A, B and C are carrying current as shown figure. Then the resultant force on B is directed ..... **[KCET 2004]**



(a) Towards A
(b) Towards C **[Kerala PET 2001]**
(c) Perpendicular to the plane of paper and outward
(d) Perpendicular to the plane of paper and inward

82. Two long conductors, separated by a distance d carry current I_1 and I_2 in the same direction. They exert a force F on each other. Now the current in one of them is increased to two times and its directions is reversed. The distance is also increased to 3d. The new value of the force between them is **[AIEEE 2004]**

(a) $-2F$ (b) $F/3$
(c) $2F/3$ (d) $-F/3$

83. The resultant magnetic moment of neon atom will be **[Kerala PET 2001]** **[J & K CET 2004]**

(a) Infinity (b) μ_B
(c) Zero (d) $\mu_B/2$

84. A one metre long wire is lying at right angles to the magnetic field. A force of 1 $kg\ wt.$ is acting on it in a magnetic field of 0.98 *Tesla*. The current flowing in it will be **[J & K CET 2004]**

(a) 100 A **[Kerala (Med.) 2002]** (b) 10 A
(c) 1 A (d) Zero

85. A beam of electrons and protons move parallel to each other in the same direction, then they **[DCE 2004]**

(a) Attract each other (b) Repel each other
(c) No relation (d) Neither attract nor repel

86. Two parallel wires of length 9 m each are separated by a distance 0.15 m. If they carry equal currents in the same direction and exerts a total force of 30×10^{-7} *N* on each other, then the value of current must be **[MH CET 2003]**

(a) 2.5 *amp* (b) 3.5 *amp*

(c) 1.5 *amp* (d) 0.5 *amp*

87. Current *i* is carried in a wire of length *L*. If the wire is turned into a circular coil, the maximum magnitude of torque in a given magnetic field *B* will be **[Pb. PET 2004]**

(a) $\frac{LiB^2}{2}$ (b) $\frac{Li^2B}{2}$

(c) $\frac{L^2iB}{4\pi}$ (d) $\frac{Li^2B}{4\pi}$

88. In ballistic galvanometer, the frame on which the coil is wound is non-metallic to **[MH CET 2004]**

(a) Avoid the production of induced e.m.f.

(b) Avoid the production of eddy currents

(c) Increase the production of eddy currents

(d) Increase the production of induced e.m.f.

89. Two thin, long, parallel wires, separated by a distance '*d*' carry a current of '*i*' *A* in the same direction. They will **[AIEEE 2005]**

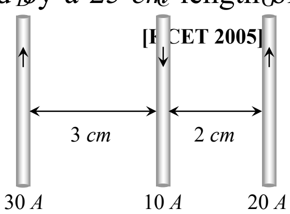
(a) Attract each other with a force of $\mu_0 i^2/(2\pi d^2)$

(b) Repel each other with a force of $\mu_0 i^2/(2\pi d^2)$

(c) Attract each other with a force of $\mu_0 i^2/(2\pi d)$

(d) Repel each other with a force of $\mu_0 i^2/(2\pi d)$

90. Three long, straight parallel wires carrying current, are arranged as shown in figure. The force experienced by a 25 *cm* length of wire *C* is **[K CET 2005]**



(a) 10^{-3} *N*

(b) 2.5×10^{-3} *N*

(c) Zero

(d) 1.5×10^{-3} *N*

91. A circular coil of 20 turns and radius 10 *cm* is placed in uniform magnetic field of 0.10 T normal to the plane of the coil. If the current in coil is 5 A, then the torque acting on the coil will be **[J & K CET 2005]**

(a) 31.4 *Nm* (b) 3.14 *Nm*

(c) 0.314 *Nm* (d) Zero