MAGETISM

LEVEL# 1

Questions based on Bar magnet

Q.1 The ratio of magnetic fields due to a smaller bar magnet in the end on position to broad side on position is-
(A) 1/4 (B) 1/2 (C) 1 (D) 2

Q.2 Potential energy of a bar magnet of magnetic moment M placed in a magnetic field of induction B such that it makes an angle θ with the direction of B is -
(A) MB sin θ (B) – MB cos θ
(C) MB (1 – cos θ) (D) MB (1+ cosθ)

Q.3 In the above question, torque acting on magnet is -
(A) MB sin θ (B) – MB cos θ
(C) MB cos θ (D) MB (1 – cos θ)

Q.4 In Q.No. 3 position of stable equilibrium of magnet is given by θ equal to -
(A) 0º (B) 90º (C) 45º (D) 180º

Q.5 A current of 3 A is flowing in a plane circular coil of radius 4 cm and number of turns 20. The coil is placed in a uniform magnetic field of magnetic induction 0.5 T. Then the dipole moment of the coil is -
(A) 3000 Am^2 (B) 0.3 Am^2
(C) 300 A m^2 (D) 75 A m^2

Q.6 A current carrying loop is placed in a uniform magnetic field. The torque acting on it does not depend upon -
(A) area of loop (B) shape of loop
(C) value of current (D) magnetic field

Q.7 The points A and B are situated perpendicular to the axis of 2 cm long bar magnet at large distances x and 3x from the centre on opposite sides. The ratio of magnetic fields at A and B will be approximately equal to -
(A) 27 : 1 (B) 1 : 27
(C) 9 : 1 (D) 1 : 9

Q.8 A compass needle is placed at the magnetic pole it -
(A) points N–S
(B) points E–W
(C) becomes vertical
(D) may staying any direction

Q.9 A bar magnet is cut into two equal halved by a plane parallel to the magnetic axis. Of the following physical quantities the one which remains unchanged is -
(A) Pole strength
(B) Magnetic moment
(C) Intensity of magnetisation
(D) Moment of inertia

Q.10 Two isolated point poles of strength 30 A-m and 60 A-m are placed at a distance of 0.3 m. The force of repulsion is -
(A) 2×10^{-3} N (B) 2×10^{-4} N
(C) 2×10^{5} N (D) 2×10^{-5} N

Q.11 Magnetic lines are -
(A) continuous
(B) discontinuous
(C) sometimes continuous and sometimes discontinuous
(D) nothing can be said

Q.12 Units of pole strength of a magnet are -
(A) A m^{-1} (B) A m^2
(C) A m^{-2} (D)A m

Q.13 Magnetic monopoles cannot exist -
(A) true
(B) false
(C) may be true or false
(D) nothing can be said

Q.14 A tiny loop of current behaves as a magnetic dipole -
(A) true
(B) false
(C) may be true or false
(D) nothing can be said

Q.15 Magnetic field intensity due to a dipole varies as d^n, where n =
(A) 2 (B) –2 (C) 3 (D) – 3

Q.16 A short bar magnet place with its axis at 30º, with a uniform external magnetic field of 0.25 T experiences a torque of 4.5×10^{-2} N-m Magnetic moment of the magnet is -
(A) 0.36 JT^{-1} (B) 0.72 JT^{-1}
(C) 0.18 JT^{-1} (D) zero

Q.17 A closely wound solenoid of 800 turns has area of cross section 2.5 cm^2. Magnetic moment associated with it, when it carries a current of 3 A is -
(A) 0.6 JT^{-1} (B) 0.06 JT^{-1}
(C) 6 JT^{-1} (D) None of these

Q.18 The magnetic field strength at distance d due to an isolated pole of strength m ampere is-
(A) $\frac{\mu_0}{4\pi}\frac{m}{d}$ (B) $\frac{\mu_0}{4\pi}\frac{m}{d^3}$
(C) $\frac{\mu_0}{4\pi}\frac{m}{(d^2-t^2)}$ (D) $\frac{\mu_0}{4\pi}$ m/d^2

Q.19 The magnetic field due to a magnetic dipole of magnetic moment M at a point on the axis of the dipole and at a distance d from it (in CGS Unit) is given by -
(A) M/d^2 (B) $2M/d^2$
(C) $2M/d^3$ (D) $2M/d^4$

Q.20 The magnetic moment of a magnet is 0.1 amp × m^2 . It is suspended in a magnetic field of intensity 3×10^{-4} Weber/m^2. The couple acting upon it when deflected by 30º from the magnetic field is -
(A) 1×10^{-5} Nm (B) 1.5×10^{-5} Nm
(C) 2×10^{-5} Nm (D) 2.5×10^{-5} Nm

Q.21 In the unmagnetized state, magnetic domains of a magnetic substance are oriented at -
(A) 60º (B) 90º
(C) Randomly (D) zero

Q.22 The time period of a freely suspended magnet does not depend upon -
(A) length of magnet
(B) pole strength of magnet
(C) horizontal component of earth's field
(D) length of the suspension

Q.23 The magnetic induction B and the force F on a pole m are related by -
(A) B = mF (B) F = $\frac{B}{m}$
(C) F = mB (D) None of these

Q.24 Calculate force exerted on a point N pole of 3200 A-m placed 10 cm away from a point south pole of 10 A-m in air -
(A) 1 N (B) 0.32 N
(C) 2 N (D) 3 N

Q.25 Force acting on a magnetic pole of 7.5×10^{-2} A-m is 1.5 N. Magnetic field at the point is -
(A) 20 Wb/m^2 (B) 50 Wb/m^2
(C) 112.5 T (D) 2.0 T

Q.26 Magnetic potential at a point distant d from a magnetic pole of strength m is -
(A) $\frac{\mu_0}{4\pi}\frac{m}{d}$ (B) $\frac{\mu_0}{4\pi}\frac{m}{d^2}$
(C) $\frac{\mu_0}{4\pi}\frac{2m}{d}$ (D) None of these

Q.27 Force between two magnetic poles depends on -
(A) pole strength only
(B) distance only
(C) medium only
(D) All the three above

Q.28 A point at which two or more magnetic fields cancel each other is called -
(A) focal point (B) inversion point
(C) neutral point (D) none of these

Questions based on Earth Magnet

Q.29 The horizontal component of earth's magnetic field at any place is 0.36×10^{-4} Weber/m^2. If the angle of dip at that place is 60º then the value of vertical component of earth's magnetic field will be (in Wb/m^2) -
(A) 0.12×10^{-4} (B) 0.24×10^{-4}
(C) 0.40×10^{-4} (D) 0.62×10^{-4}

Q.30 The value of angle of dip at a place on earth is 45º. If the horizontal component of earth's magnetic field is 5×10^{-5} Tesla then the total magnetic of earth's magnetic field of earth will be -

(A) $5\sqrt{2} \times 10^{-5}$ Tesla

(B) $10\sqrt{2} \times 10^{-5}$ Tesla

(C) $15\sqrt{2} \times 10^{-5}$ Tesla

(D) zero

Q.31 At a certain place, horizontal component is $\sqrt{3}$ times the vertical component. The angle of dip of this place is -

(A) 0 (B) $\pi/3$

(C) $\pi/6$ (D) none of these

Q.32 When a magnet marked N S is suspended in a horizontal position, so that it is free to rotate, the pole marked N shall point towards -

(A) south pole of earth's magnet

(B) north pole of earth's magnet

(C) geographic N pole

(D) geographic S pole.

Q.33 Two bar magnets of the same mass, same length and breadth but having magnetic moments M and 2 M are joined together pole for pole and suspended by a string. The time period of assembly in a magnetic field of strength H is 3 seconds. If now the polarity of one of the magnets is reversed and combination is again made to oscillate in the same field, the time of oscillating is -

(A) $\sqrt{3}$ sec (B) $3\sqrt{3}$ sec

(C) 3 sec (D) 6 sec

Q.34 The periods of oscillation of two magnets in the same field are in the ratio 2 : 1. If their moments of inertia are equal, ratio of their magnetic moments is -

(A) 1 : 2 (B) 1 : 4

(C) 2 : 1 (D) 4 : 1

Q.35 Time periods of vibration of two bar magnets in sum and difference positions are 4 sec and 6 sec respectively. The ratio of their magnetic moments $\frac{M_1}{M_2}$ is -

(A) 6 : 4 (B) 30 : 16

(C) 2.6 :1 (D) 1.5 : 1

Questions based on Instruments

Q.36 Two magnets A and B are equal in length, breadth and mass, but their magnetic moments are different. If the time period of B in a vibration magnetometer is twice that of A, then the ratio of magnetic moments will be -

(A) 1/2 (B) 2

(C) 4 (D) 12

Q.37 The time period of vibration of two magnets in sum position is 3 sec. When polarity of weaker magnet is reversed, the combination makes 12 oscillations per minute. Compare the magnetic moments of two magnets.

(A) 4 (B) $\frac{17}{8}$ (C) $\frac{13}{8}$ (D) $\frac{1}{4}$

Q.38 The period of oscillation of a bar magnet in a vibration magnetometer is 2 Sec. The period of oscillation of a bar magnet whose magnetic moment is 4 times that of 1st magnet is -

(A) 4 sec (B) 1 sec

(C) 2 sec (D) 0.5 sec

Q.39 The time period of oscillation of a magnet in a vibration magnetometer is 1.5 sec. The time period of oscillation of another magnet similar in size, shape and mass but having 1/4 magnetic moment than that of the 1st magnet oscillating at the same place will be –

(A) 0.75 sec (B) 1.5 sec

(C) 3.0 sec (D) 6.0 sec

Q.40 The period of oscillation of a magnet in a vibration magnetometer is 2 seconds. The period of oscillate of a magnet of moment of inertia four times that of the first magnet is-

(A) 1 sec (B) 4 sec

(C) 8 sec (D) 0.5 sec

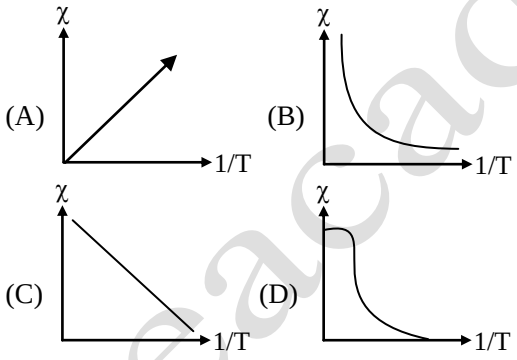
Q.41 The arms of a deflection magnetometer in the tangent B position are placed along -
(A) the east west direction
(B) the north south direction
(C) the north east-south west direction
(D) the north west-south east direction .

Q.42 In deflection magnetometer in the tangent B position bar magnet is placed along -
(A) The east - west direction
(B) The north - south direction
(C) The north east, south west direction
(D) The north west, south east direction.

Q.43 The radius of coil of tangent galvanometer is 16 cm. How many turns of wire should be used if a current of 40 mA is produced the deflection of 45°. $B_H = 3.6 \times 10^{-5}$ T
(A) 458 (B) 229
(C) 200 (D) 115

Questions based on Magnetic properties of material

Q.44 The correct curve between χ and $\frac{1}{T}$ for paramagnetic magnetic is -



Q.45 The volume susceptibility of a magnetic material is 30×10^{-4}. Its relative permeability will be -
(A) 31×10^{-4} (B) 1.003
(C) 1.0003 (D) 29×10^{-4}

Q.46 A rod of ferromagnetic material with dimensions 10 cm × 0.5 cm × 0.2 cm is placed in a magnetic field of strength 0.5×10^4 amp/m as a result of which a magnetic moment of 5 amp-m^2 is produced in the rod. The value of magnetic induction will be -
(A) 0.54 Tesla (B) 0.358 Tesla
(C) 2.519 Tesla (D) 6.28 Tesla

Q.47 On placing a piece of ferromagnetic material of cross-sectional area 1 cm^2 in magnetic field of 200 oersted, flux density of 3000 Gauss is produced in it. The values of relative permeability and magnetic susceptibility of the material will respectively be -
(A) 11.9 and 150 (B) 150 and 11.9
(C) 50 and 11.9 (D) 15 and 14

Q.48 The mass of an iron rod is 80 gm and its magnetic moment is 10 A-m^2. If the density of iron is 8 gm/C.C. Then the value of intensity of magnetisation will be -
(A) 10^6 A/m (B) 10^4 A/m
(C) 10^2 A/m (D) 10 A/m

Q.49 If μ_0 is absolute permeability of vacuum and μ_r is relative magnetic permeability of another medium, then permeability μ of the medium is -
(A) $\mu_0 \mu_r$ (B) μ_0/μ_r
(C) μ_r/μ_0 (D) $1/\mu_0\mu_r$

Q.50 Every atom of every substance is a complete magnet in itself -
(A) true
(B) false
(C) may be true or false
(D) nothing can be said

Q.51 The dimensions of magnetic permeability are-
(A) $[MLT^{-2} A^{-2}]$ (B) $[ML^2 T^{-2} A^{-2}]$
(C) $[ML^2 T^{-2} A^{-1}]$ (D) $[M^{-1}LT^{-2} A^{-2}]$

Q.52 S.I. unit of magnetic permeability is -
(A) A-m (B) Am^2 (C) H-m (D) H/m

Q.53 For a diamagnetic material
(A) $\mu_r > 1$, $\chi_m > 1$ (B) $\mu_r > 1$, $\chi_m < 1$
(C) $\mu_r < 1$, $\chi_m < 0$ (D) $\mu_r < 1$, $\chi_m > 0$

Q.54 The most suitable metal for making electro magnets and transformer cores is -
(A) steel (B) iron
(C) copper (D) aluminium

Q.55 The most suitable metal for permanent magnets is -
(A) steel (B) iron

(C) copper (D) aluminium

Q.56 Curie's law states that
(A) magnetic susceptibility is inversely proportional to the absolute temperature
(B) magnetic susceptibility is inversely proportional the square root of the absolute temperature
(C) magnetic susceptibility is directly proportional to the absolute temperature
(D) magnetic susceptibility

Q.57 For a paramagnetic material, the dependence of the magnetic susceptibility χ, on the absolute temperature T is given by -
(A) $\chi \propto T$
(B) $\chi \propto \sqrt{T}$
(C) $\chi \propto \frac{1}{T}$
(D) χ = constant.

Q.58 Domain formation is a necessary feature of -
(A) diamagnetism (B) ferromagnetism
(C) paramagnetism (D) all of the above.

Q.59 The permanent magnetic moment of atoms or molecules of a diamagnetic material is -
(A) small (B) large
(C) negative (D) zero.

Q.60 The relation between magnetic susceptibility x_m and relative permeability μ_r, is -
(A) $x_m = \mu_r$ (B) $x_m - 1 = \mu_r$
(C) $\mu_r = 1 + x_m$ (D) $\mu_r = 1 - x_m$

Q.61 When a ferromagnetic material is heated above its Curie temperature,
(A) it gets demagnetised
(B) it becomes diamagnetic
(C) behaves like a paramagnetic substance
(D) remains unaffected

Q.62 If M is magnetic moment developed in the material having volume V, then intensity of magnetisation is given by the expression
(A) MV (B) M/V
(C) $M\sqrt{V}$ (D) $M/\sqrt{V}$

Q.63 The relative permeability of a medium is 0.075. What is its magnetic susceptibility ?
(A) 0.925 (B) – 0.925
(C) 1.075 (D) – 1.075

Q.64 The moment of a magnet (15 cm × 2 cm × 1 cm) is 1.2 A-m^2. What is its intensity of magnetisation ?
(A) 4×10^4 Am^{-1} (B) 2×10^4 Am^{-1}
(C) 10^4 Am^{-1} (D) None

Q.65 The hysterisis curve is studied generally for-
(A) ferromagnetic materials
(B) paramagnetic materials
(C) diamagnetic materials
(D) all of these