PHYSICS

BOOKS - MODERN PUBLICATION PHYSICS (KANNADA ENGLISH)

MAGNETOSTATICS

Multiple Choice Question Level I

1. If a bar magnet is placed with its north pole pointing towards north of earth the neutral

points are loacted

A. on the axial line

B. on the equatorial line

C. on the line making an angle θ with axis wher θ can have any value

D. on the line making an anlge of 45° with axis

Answer: B

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2. Two identical thin bar magnets each l and pole strength m are placed at right angle to each other with north pole of one touching south of other the magnetic moment of the system is

A. ml

B. 2ml

C. $\sqrt{2}ml$

D. $\frac{ml}{2}$

Answer: C

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3. A steel wire of length l has a magnetic moment M. It is then bent into a semicircular arc. The new magnetic moment is

A. ml

B. $\frac{2m}{\pi}$

C. $\frac{m}{l}$

D. $m \times l$

Answer: B

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4. At a certain place the angle of dip is 30° and horizontal compontent of earth 's field is 0.5 oersted the earth 's total magnetic field in oersted is

A. $\sqrt{3}$

B. 1

C. $\frac{1}{\sqrt{3}}$

D. $\frac{1}{2}$

Answer: C

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5. A circular coil of 100 turns has an effective radius of 0.05 m and current of 0.1 A how much work is done to trun it through 180° in a uniform field of 1.5 wbm^2 if the plane of the coil is initally perpendicular to the magnetic field

A. 0.5523 j

B. 0.3255 j

C. 0.2355 j

D. 0.5235 j

Answer: C

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6. A dip circle lies initially in the magnetic meridian if it is now rotated through angle θ in the horizontal plane then tangent of the angle of dip is changed in the ratio

A. $1 : \cos\theta$

B. $\cos\theta : 1$

C. $1 : \sin\theta$

D. $\sin\theta : 1$

Answer: A

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7. The anlge of dip at a place where horizontal and cvertical componentts are equal is

A. zero

B. 45°

C. 90°

D. 30°

Answer: B

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8. Isoclinic lines are the lines joining places of :

A. equal dip

B. equal declination

C. equal value of h

D. equal dip and declination both

Answer: A

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9. Isoclinic lines are the lines joining places of :

A. zero declination

B. equal declination

C. equal dip

D. equal horizontal field

Answer: B

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10. Agonic lines are

A. zero declination

B. equal declination

C. zero dip

D. equal dip

Answer: A

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11. Aclinic alines are of

A. zero declination

B. equal declination

C. zero dip

D. equal dip

Answer: C

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12. The plane of dip circle is set in the geographical meridian and the apparent dip is θ_1 it is then set in a vertical plane prependicular to the geopgraphical meridian the apparent dip becomes θ_2 the angle of declination α is given by

A. $\tan\alpha = \sqrt{\tan\theta_1 \times \tan\theta_2}$

B. $\tan\alpha = \sqrt{\tan\theta_1 \times \tan\theta_2}^2$

C. $\tan\alpha = \tan\theta_1 / \tan\theta_2$

D. $\tan\alpha = \tan\theta\sqrt{\tan}\theta_1$

Answer: C

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13. A magnet of pole strength m is divided into fiour equal parts so sthat the length as well then the pole strength of each is

A. $\frac{m}{4}$

B. $\frac{m}{8}$

C. $\frac{m}{2}$

D. $4m$

Answer: C

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14. In the above question the dipole moment of each is

A. ml

B. $\frac{m}{2}$

C. $\frac{m}{4}$

D. $\frac{m}{8}$

Answer: C

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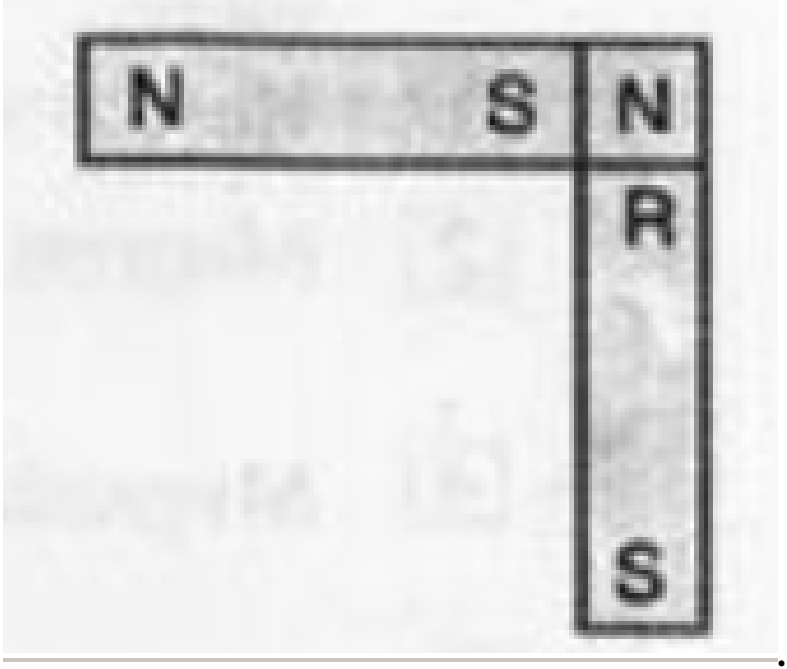
15. Two identical bar magnets each of dipole moment p_m and length l are perpendicular to each other as shown in the figure



. The dipole moment of the combination is :

A. $2m$

B. $\sqrt{2}m$

C. $\frac{m}{2}$

D. $\frac{m}{\sqrt{2}}$

Answer: B

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16. The work done to trun a magnet by 60° from its equilibrium position is W in a uniform the torque required to hold it in that postion will be

A. $\frac{w}{2}$

B. $\frac{w}{\sqrt{3}}$

C. $\frac{\sqrt{3}}{2}w$

D. $w\sqrt{3}$

Answer: D

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17. At the magnetic north pole of the earth the value of the horizontal component H and the angle of dip θ is

A. $H = 0, \theta = 45^\circ$

B. $H = 0, \theta = 0^0$

C. $H = 0, \theta = 90^\circ$

D. $H = 1, \theta = 45^\circ$

Answer: C

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18. At 45° to the magnetic meridian the apparent is 60° the true dip is

A. $\tan^{-1}\sqrt{3}$

B. $\tan^{-1}\dfrac{1}{\sqrt{3}}$

C. $\tan^{-1}\sqrt{\frac{3}{2}}$

D. $\tan^{-1}\sqrt{\frac{1}{6}}$

Answer: C

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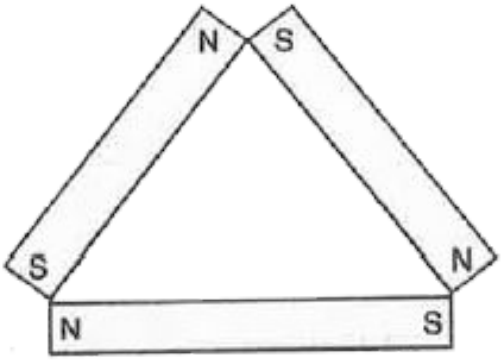
19. Three identical bar magnets each of magnetic moment M are placed in the form of an equilateral triangle with north pole of one touching the south pole of the other the net

magnetic moment of the system is



A. zero

B. 2m

C. $3m/2$

D. $\sqrt{3}m$

Answer: A

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20. A compass needle of magnetic moment 60 Am^2 pointing geopgraphical north at a place where the horizontal component of earth fiedl is 40 μWbm^{-2} experiences a torque of 1.2×10^{-3} Nm the declination of the place is

A. 15°

B. 30°

C. 45°

D. 60°

Answer: B

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21. If δ_1 and δ_2 be the apparent values of the dip observed in two planes at right angles to each other and δ is the true value of the dip then

A. $\sin^2\delta = \sin^2\delta_1 + \sin^2\delta_2$

B. $\cot^2\delta = \cot^2\delta_1 + \cot^2\delta_2$

C. $\tan^2\delta = \tan^2\delta_1 + \tan^2\delta_2$

D. $\cos^2\delta = \cos^2\delta_1 + \cos^2\delta_2$

Answer: B

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22. The diamagnetic material has susceptibility

A. $x = 0$

B. $x < 0$

C. $x > 1$

D. $x < 1$

Answer: D

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23. A bar magnet of magnetic moment M is kept in a uniform magnetic field of strength B making an angle θ with its direction the torque acting on it is

A. $mb\cos\theta$

B. mb

C. $mb(1-\cos\theta)$

D. $mb\sin\theta$

Answer: D

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24. The force between two short bar magnets with magnetic moments M_1 and M_2 whose centres are r metre apart is 8.0 N. if the seperation is increased to 2r, then force between then is reduced to

A. 4.0 n

B. 2.0 n

C. 1.0 n

D. 0.5 n

Answer: D

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25. To shield an instrument from ah external magnetic field it may be placed in a cabinet made of :

A. wood

B. ebonite

C. iron

D. dimagnetic substance

Answer: C

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26. Rate of change of torque τ with deflection θ is maximum for a magnet suspended freely

in a uniform magnetic field of induction B when

A. $\theta = 0^\circ$

B. $\theta = 45^\circ$

C. $\theta = 60^\circ$

D. $\theta = 90^\circ$

Answer: A

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27. The work done in turning a magnet of magnetic moment M by an angle 90° to the work done in turning it through an anlge of 60° is

A. $\frac{1}{2}$

B. 2

C. $\frac{1}{4}$

D. 1

Answer: B

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28. A compass needle when placed at a magnetic pole stays along

A. south north direction only

B. east west direction only

C. any direction

D. none of above

Answer: C

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29. Permanent magnets are made of steel because steel has

A. low retentivity and low coercive field

B. high retentivity and high coercive field

C. low retentive and high coercive field

D. high retentivity and low coercive field

Answer: B

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30. At a place of latitude 5° the angle of dip is nearly

A. 5°

B. 10°

C. 2.5°

D. 7.5°

Answer: B

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31. A steel wire of length l has a magnetic moment M it is bent in L shape at its mid point the new magnetic moment is

A. m

B. $\frac{m}{\sqrt{2}}$

C. $\frac{m}{2}$

D. 2m

Answer: B

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32. A permanent magnet

A. attaract all substances

B. attracts only magnetic substances

C. attract magnetic substances and repels all non magnetic substances

D. repels all non magnetic substance

Answer: B

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33. A person is facing magnetic north an electron in front of him files horizontally towards the north and deflects towards east he is in at

A. northern himispher

B. southern hemisphere

C. equaltor

D. cannot be predicted

Answer: A

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34. A magnetic field is measured by

A. avometer

B. pyrometer

C. fluxmeter

D. thermopile

Answer: C

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35. A magnet of pole strength m is divided into four equal parts so that the length and breadth of each part is half than that of the original magnet then pole strength of each is

A. m

B. $\frac{m}{4}$

C. $\frac{m}{2}$

D. 4m

Answer: C

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36. When a dimagnetic substance is brought near north or south pole of a bar magnet it is

A. attarcted by the poles

B. repelled by the poles

C. attracted by north pole and repelled by south pole

D. repelled by north pole and attracted by south pole

Answer: B

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37. A dip circle lies initially in the magnetic meridian if it is now rotated through angle θ in the horizontal plane then tangent of the angle of dip is changed in the ratio

A. $\frac{\tan\Phi}{\tan\Phi} = \frac{1}{\sin\theta}$

B. $\frac{\tan\Phi}{\tan\Phi} = \frac{1}{\cos\theta}$

C. $\frac{\tan\Phi}{\tan\Phi} = \frac{1}{\tan\theta}$

D. $\frac{\tan\Phi}{\tan\Phi} = \frac{1}{\cot\theta}$

Answer: B

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38. A thin circular loop carrying a current has a radius 100 mm and magnetic induction at its centre is 6.0 μt then magnetic moment of the loop is

A. $15ma - m^2$

B. $30ma - m^2$

C. $45ma - m^2$

D. $60ma - m^2$

Answer: B

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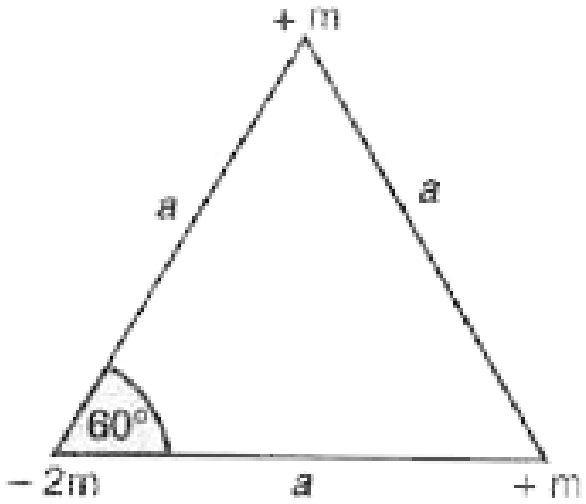
39. The magnetic moment of the system will be



A. $\sqrt{3}ma$

B. ma

C. 2ma

D. none of these

Answer: A

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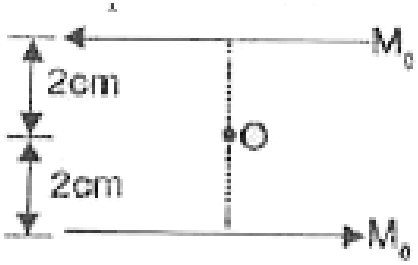
40. Two small magnets each of magnetic moment M_0 is placed parallel to each other the magnetic field at point O is



A. $zero$

B. 4×10^{-4}N

C. 2×10^{-4} N

D. none of these

Answer: A

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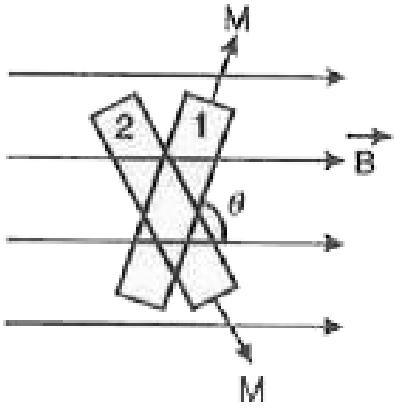
41. M and $M\sqrt{3}$ are the magnetic dipole moments of the two magnets which are joined to form a cross figurre the inclination of the system with the fiedl if their combination is suspended freely in a uniform external

magnetic field B is



A. $\theta = 30^\circ$

B. $\theta = 45^\circ$

C. $\theta = 60^\circ$

D. $\theta = 15^\circ$

Answer: C

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42. Two like poles of strength m_1 and m_2 are far distance apart the energy required to bring them r_0 distance apart is

A. $\frac{\mu_0}{4\pi}\frac{m_1 m_2}{r_0}$

B. $\frac{\mu_0}{8\pi}\frac{m_1 m_2}{r_0}$

C. 0

D. $\frac{\mu_0}{4\pi}\frac{m_1 m_2}{r_0}$

Answer: A

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43. Large transformer when used for sometime become very hot and cooled by circulating oil the heating of the transformers is due to

A. the heating effect of the current alone

B. hysteresis loss alone

C. hysteresisi loss effect of the current

D. the intense sunligh at noon

Answer: C

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44. A magnet of magnetic moment M is cut in to two equal parts the resultant magnetic moment is

A. $\sqrt{2}$m

B. $\frac{m}{\sqrt{2}}$

C. $\sqrt{3}m$

D. $\frac{m}{\sqrt{3}}$

Answer: B

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45. The susceptibility of the paramagnetic substance is :

A. very large

B. positive

C. positive and small

D. ve and small

Answer: C

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46. Alnico is preferred for making permanent magnets due to its :

A. large

B. + ve nd very large

C. -ve and very large

D. none of the above

Answer: B

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47. Alnico is preferred for making permanent magnets due to its :

A. high retentivity low coercivity

B. low retentivity high coercivity

C. low retenivity low coercivity

D. high retentivity high coercivity

Answer: D

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48. Soft iron is preferred as the core of transformers due to its :

A. high retentivity low coercivity and low hystersis loss

B. high retentivity high coercivity and low hystresis loss

C. low retentivity low coercivity and high hystresis loss

D. low retentivity gigh coercivity & hysteresis loss

Answer: A

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49. The distance between two magnetic pole is doubled and the pole strength of each is halved, the force between them will be

A. $\frac{1}{16}$

B. four times

C. two times

D. none of the above

Answer: A

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50. At a certain palce the horizotnal component of earth mag field is B_0 and angle of dip is 45° the resulatant field intensity at that place will be

A. B_0

B. $2B_0$

C. $\sqrt{2}B_0$

D. $\frac{B_0}{\sqrt{2}}$

Answer: C

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51. Relation between vertical component v and horizontal component H at a place where angle of dip is 60°

A. V=H

B. $V = \sqrt{3}$H

C. $H = \frac{\sqrt{3}}{2}$ V

D. $H - \sqrt{3}V$

Answer: B

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52. The magnetic resonance imaging is based on the phenomenon of

A. electron spin resonance

B. electron paramagnetic resonance

C. nuclear magnetic resonance

D. diamagnetism of human tissue

Answer: C

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53. Liquid oxygen remains suspeded two poles of a magnet because it is

A. diamgnetic

B. paramagnetic

C. ferromagnetic

D. antiferromagnetic

Answer: B

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54. At which place earth magnetic field becomes horizontal

A. magnetic dipole

B. geographical pole

C. magnetic meridian

D. magnetic equator

Answer: D

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55. The distance of two points on the axis of a magnet from its centre is 10 cm and 20 cm respectively the ratio of magnetic intensity at

these points is 12.5 :1 the length of the magnet will be

A. 20 cm

B. 10 cm

C. 25 cm

D. 5 cm

Answer: D

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56. Above curie temperature

A. a paramagnetic substance becomes ferro magnetic

B. a ferromagnetic substance becomes paramagnetic

C. a paramagnetic substance becomes diamagnetic

D. a dimagnetic substance becomes paramagnetic

Answer: B

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57. Nickel shows ferromagnetic property at room temperature if the temperature is incresed beyond curie temperatrure then it will show

A. anti ferromagnetism

B. no magnetic propety

C. diamgnetism

D. paramgnetism

Answer: D

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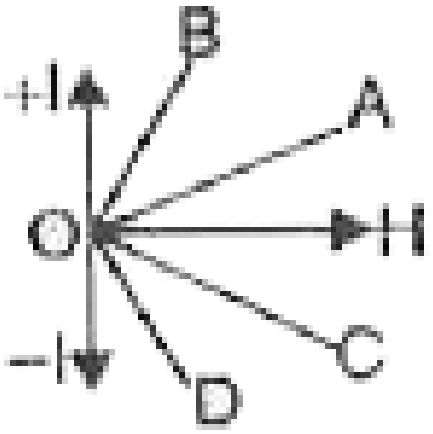
58. The variation of the intensity of magnetisation with respect to the magnetisign field H in a diamagnetic

substance is described by the graph



A. od

B. oc

C. ob

D. oa

Answer: B

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59. The magnetic fields at two points lying at same distance from an isolated pole are

A. the same both in magnitude and direction

B. different both in magnitude and direction

C. the same in magnitude nad different in directions

D. different in magnitude but same in direction

Answer: C

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60. A long magnet is cut into two parts in such a way that the ratio of their lengths is 2:1 the ratio of pole strengths of both the section is

A. $equaldip$

B. $2:1$

C. $1:2$

D. $4:1$

Answer: A

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61. The needle in the dip circle stands vertical when the plane of the circle is

A. horizontal

B. the magnetic meridian

C. vertical

D. to magnetic meridian

Answer: D

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62. Ther is no couple acting when two bar magnets are placed coaxially since

A. there are no forces on the plots

B. the forces are ll to each other

C. the forces are ii lines of actio do not coinicide with each other

D. none of the above

Answer: D

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63. In a magnet of pole strength m is divided in to 2n parts by cutting along lines parallel to length then pole strength of each part will be

A. same

B. $\frac{1}{n}$ times

C. $\frac{1}{2n}$ times

D. $\frac{1}{4n}$ times

Answer: C

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64. A magnetic needle lying parallel to a magnetic field requires the torque needed to maintain the needle in this position will be

A. $\sqrt{3}$ w

B. $\frac{w}{2-\sqrt{3}}$

C. $\frac{\sqrt{3w}}{2}$

D. 2 w

Answer: B

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65. Two identicla short bar magnets each having magnetic moment of $10am^2$ are arranged such that their axial lines are

perpendicular to ech other and their centres 0.2 m the resultant magnetic inducito at a point midway betweeen them is

A. $\sqrt{2} \times 10^{-7}$ tesla

B. $\sqrt{5} \times 10^{-7}$ tesla

C. $\sqrt{2} \times 10^{-3}$ tesla

D. $\sqrt{5} \times 10^{-3}$ tesla

Answer: D

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66. A bar magnet of length 10 cm and having the pole strength equal to 10^{-3} weber is kept in a magnetic field having magnetic iduction equal to $4\pi \times 10^{-3}$ tesla it makes an anlge of 30° with the direction of magnetic induciotn the value of hte torque acting on the magnet is

A. $2\pi \times 10^{-7} n \times m$

B. $2\pi \times 10^{-5} n \times m$

C. $0.5n \times m$

D. $0.5 \times 10^{-2} n \times m$

Answer: A

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67. A straight wire carrying current I is turned into circular loop if the magnitude of magnetic moment associated with it in is m the length of wire will be

A. $4\pi imn$

B. $\sqrt{\frac{4\pi m}{i}}$

C. $\frac{\sqrt{4\pi i}}{m}$

D. $\frac{m\pi}{4i}$

Answer: B

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68. Two similar bar magnets p and q each of magnetic moment m are taken if p is cut along its axial line and q is cut along its equatorial line all the four pieaes obtained have

A. equal pole strength

B. magnetic moment $\frac{m}{4}$

C. magnetic moment $\frac{m}{2}$

D. magnetic moment m

Answer: C

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69. A bar magnet is 10 cm long kept with its north pole pointing north. A neutral point is formed at a distance 15cm from each pole. given the horizontal component of earth field

to be 0.4 gauss the pole strength of the magnet is

A. 9A-m

B. 6.75 A-m

C. 27 A-m

D. 1.35 A-m

Answer: D

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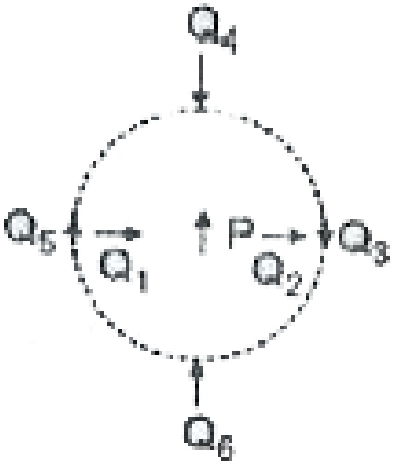
70. The figure shows the various positions of small magnetised needles P and Q the arrows show the direction of their magnetic moment which lowest potentical energy among all the configuration shown



?

A. PQ_3

B. PQ_4

C. PQ_5

D. PQ_6

Answer: D

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71. A paramagnetic substance of susceptibility 3×10^{-4} is placed in magnetic field of '4xx10^-4' magnetization in the units of Am^{-1} is

A. 1.33×10^{8}

B. 0.75×10^{8}

C. 12×10^{-8}

D. 14×10^{-8}

Answer: C

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72. A thin rectangular magnet suspended freely has a period of oscillation equal to T. Now it is broken into two equal halves (each

having half of the original length) and one piece is made to oscillate freely in the same field. If its period of oscillation is T', then the ratio $\frac{T'}{T}$ is

A. $\frac{1}{2}$

B. 2

C. $\frac{1}{4}$

D. $\frac{1}{2\sqrt{2}}$

Answer: A

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73. The work done to trun a magnet by 60° from its equilibrium position is W in a uniform the torque required to hold it in that postion will be

A. w

B. $\frac{\sqrt{3}}{2}$ w

C. 2w

D. $\sqrt{3}$w

Answer: D

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74. The magnetic lines of force inside a bar magnet

A. do not exist

B. depend upon the area of cross section of the bar magnet

C. are from s to n pole of the magnet

D. are form n to s pole of the magnet

Answer: C

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75. Above curie temperature

A. a paramagnetic material becomes diamgnetic

B. a ferromagnetic material becomes paramagnetic

C. a paramagnetic material becomes ferromagnetic

D. a ferromagnetic material becomes diamagnetic

Answer: B

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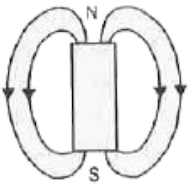
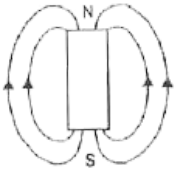
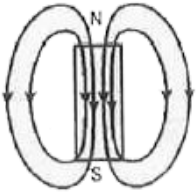
76. The magnetic field lines due to a bar magnet are correctly shown in

A. 

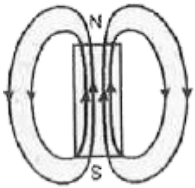
B.



C.



D.



Answer: D

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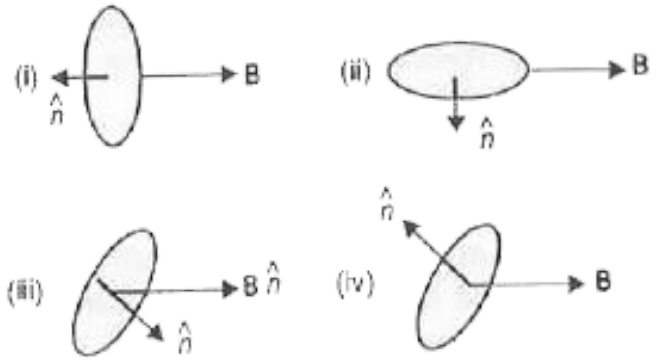
77. A current loop is placed in a uniform magnetic field in four differenent orientation I,II,III and IV arrange them in the decreasing order of potential energy



A. $I > III > II > IV$

B. $I > II > III > IV$

C. $I > IV > II > III$

D. $III > IV > I > II$

Answer: C

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78. Name the material that can be used to make electromagnets.

A. low retentivity and high coercivity

B. high rectentivity and low coercivity

C. low retentivity and low coercivity

D. high retentivity nd high coercivity

Answer: C

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79. In H atom the magnitude of magnetic field produced at the centre due ot orbital motion of an e revolving in a orbit of quantum number (n) is proportional to

A. $\frac{1}{n^5}$

B. $\frac{1}{n^3}$

C. n^3

D. n

Answer: A

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80. A magnetic needle is kept in a non uniform magneitc field it experiences

A. a force but not a torque

B. a force and a troque

C. neither a force nor a torque

D. a torque but not a force

Answer: B

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81. Needle N_1, N_2 and N_3 are made of ferromagnetic , a paramagnetic and a diamagnetic substance respectively. A magnet when brought close to them will

A. attract n_1 and n_2 strongly but repel n_3

B. attract n_1 strongly n_2 weakly and repel n_3 weakly

C. attract n_1 strongly but repel n_2 and n_3 weakly

D. attract all three of them

Answer: B

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82. Releative permiottivity and permeability of a material are `which of he following value of these quantites are allwoed for a diamagnetic material

A. $\varepsilon_r = 1.5 \mu_r = 1.5$

B. $\varepsilon_r = 0.5 \mu_r = 1.5$

C. $\varepsilon_r = 1.5 \mu_r = 0.5$

D. $\varepsilon_r = 0.5 \mu_r = 0.5$

Answer: C

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Multiple Choice Question Level I Assertion And Reasoning

1. Statement 1: The poles of a magnet cannot be separted by breaking it into two pieces

Statement 2: The magnetic moment of a bar magnet will be reduced to half when a bar magnet is broken into two equal parts

A. statement -1 is true statement -2 is true

statement -2 is a correct eaplanatio for

statement -1

B. statement -1 is true statement -2 is false

C. statement -1 is false moment -2 true

D. statement -1 is true statement -2 is true

Answer: D

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2. Statemetn 1: A compass needle suspended freely in a uniformly mag field experiences no not force but a torque that tends to align the

magnetic needle along field

Statement 2 Two equal and opposite magnetic forces on poles of needle make total force zero and this couple tends to align needle along field

A. if both statement are true and statement -2 is correct explanatio of statement -1

B. if both statement are true but statement -2 is not correct explanation of statement -1

C. statemetn -1 is false statement -2 is true

D. statement -1 is true statement -2 is true

Answer: A

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Multiple Choice Question Level I Paragraph Questions

1. A magnet of pole strength m is divided into four equal parts so that the length and

breadth of each part is half than that of the original magnet then pole strength of each is

A. $\frac{m}{4}$

B. $\frac{m}{8}$

C. $\frac{m}{2}$

D. 4m

Answer: C

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Multiple Choice Question Level I Paragraph Questions

1. A magnet of pole strength m is divided into four equal parts so that the length and breadth of each part is half than that of the original magnet then pole strength of each is

A. m

B. $\frac{m}{2}$

C. $\frac{m}{4}$

D. $\frac{m}{8}$

Answer: C

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Multiple Choice Question Level Ii

1. A short bar magnet of amgnetic moment 25 JT^{-1} is placed with its axis perpendicular to earth the resultant field is inclined at 45° with earth field if $H = 0.4 \times 10^{-4}$T

A. 5m

B. 0.5 m

C. 2.5 m

D. 0.25 m

Answer: B

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2. A magnetic dipole is under the effect of two magnetic field inclined at 75° to each other one of the fields has a magnitude of 1.5×10^{-2} t the magnets come to stable at

an angle of 30 degrees with the direction of the field. the magnitude of othe field is

A. $\frac{15}{2\sqrt{2}} \times 10^{-2} T$

B. $\frac{15}{\sqrt{2}} \times 10^{-2}$ T

C. $1.5 \times \sqrt{2} \times 10^{-2}$ T

D. 1.5×10^{-2} T

Answer: B

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3. A bar magnet with poles 25.0 apart and of pole strength 14.4 am rests with its cent4re on a frictionless point 12 cm from its pivot the magnitude of the force is

A. $15\sqrt{3}N$

B. $7.5\sqrt{3}N$

C. $3.75\sqrt{3}N$

D. none of these

Answer: C

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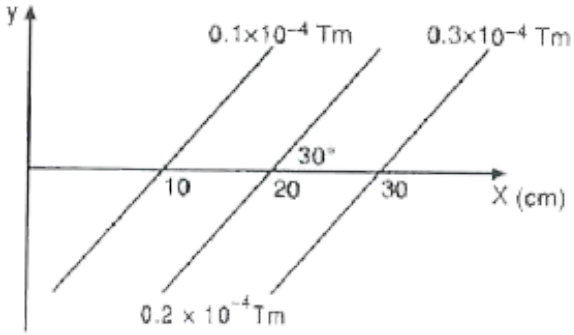
4. Some of the equipotential surfaces of the magnetic scalar potential the magnitude of magnetic field B at a point in the region is



A. $10^{-3}T$

B. $\frac{2}{\sqrt{3}} \times 10^{-4}T$

C. 2×10^{-4} T

D. $\frac{\sqrt{3}}{2} \times 10^{-4} T$

Answer: C

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5. When a long rod of iron is magnetized by means of an electric current it is found to increase in length this is called

A. magneto effect

B. magneto strictio

C. magneto restriction

D. none of these

Answer: C

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6. A magnet 20 cm long with its poles concentrated at its ends is palced vertically with its north pole on the table at a point due 20 cm if horizontal compoent of the earth 's

field is H=0.3 gauss then the pole strength of the magnet is nearly

A. 1.85 Am

B. 18.5 ab-A-cm

C. 185 A-m

D. 185 ab-A-cm

Answer: D

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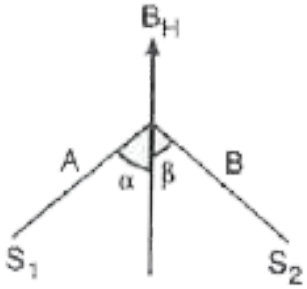
7. Two small magnets A and B of diple moments M_0 and $2M_0$ respectively are fixed perpendicualr to each other with their north poles magnetic field the value of α is



A. $\tan^{-1}(2)$

B. $\sin^{-1}(2)$

C. $\cos^{-1}\left(\frac{1}{2}\right)$

D. none of these

Answer: A

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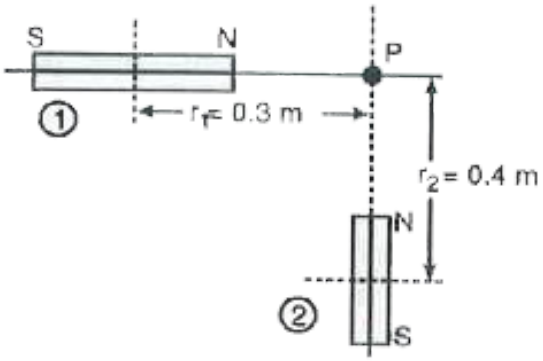
8. Two short magnets of magnetic moment 2 Am^2 and $5Am^2$ are placed along two lines drawn at right angle to each other on the sheet of paper what is the magnetic field at

the point of intersection of their axis



A. $2.15 \times 10^{-5} T$

B. $215 \times 10^{-5} T$

C. $2.15 \times 10^{-3} T$

D. $21.5 \times 10^{-5} T$

Answer: A

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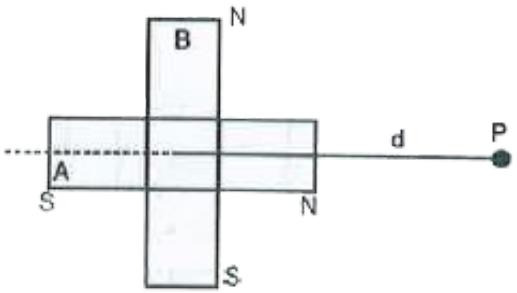
9. The magnetic induction at p for the arrangement shown in when tow similar short magnets of magnetic moment M are joined at the middle so that they are mutually perpendicualr will be



A. $\frac{m_0}{4\pi}\frac{m\sqrt{3}}{d^3}$

B. $\frac{\mu_0}{4\pi}\frac{2m}{d^3}$

C. $\frac{\mu_0 m\sqrt{5}}{4\pi d^3}$

D. $\frac{\mu_0 2m}{4\pi d^3}$

Answer: C

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10. The real angle of dip if a magnet is suspended at an angle of 30° needle makes and angle of 45° with horizontal is

A. $\tan^{-1} sqr\frac{3}{2}$

B. $\tan^{-1}\sqrt{3}$

C. $\frac{\tan^{-1}\sqrt{3}}{2}$

D. $\frac{\tan^{-1}(2)}{\sqrt{3}}$

Answer: A

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11. Two short bar magnets of magnetic moment M each are arranged at the opposite corners of a square of side d such that their

centre coincide with the corners same directio the magnetic inducition at any of the other corner of the squre is

A. $\frac{\mu_0}{4\pi}\frac{m}{d^3}$

B. $\frac{\mu_0}{4\pi}\frac{m\sqrt{2}}{d^3}$

C. $\frac{\mu_0}{4\pi}\frac{m\sqrt{5}}{d^3}$

D. $\frac{\mu_0}{4\pi}.\frac{3m}{d^3}$

Answer: A

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12. A coil in the shape of an equilateral triangle of side l is suspended between the pole pieces of a permanent magnet such that B fixed in plane of the coil if due to current I in the triangle a troque γ acts on it then side of the triangle is

A. $\frac{1}{\sqrt{3}} \frac{r}{b1}$

B. $\frac{2}{\sqrt{3}} \frac{r}{b1}$

C. $\frac{2}{\sqrt{3}} \frac{r}{(1)^{1/2}}$

D. $\frac{2}{\sqrt{3}} \frac{r}{\sqrt{3b1}^{1/2}}$

Answer: D

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13. A bar magnet 20 cm in length is placed with its south pole towards geographical north the neutral points are situated at a distance of 40 cm from the centre of the magent if $H = 3.2 \times 10^{-5}$ weber/$metre^2$ then the pole strength of the magnet is

A. $9000ab - a \times cm$

B. $900ab - a \times cm$

C. $450ab - a \times cm$

D. $225ab - a \times cm$

Answer: C

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14. The relative permeability is represented by μ_r and the susceptibility by χ for a magnetic substance. Then for a paramagnetic substance

A. $\mu_r < 1, x < 0$

B. $\mu_r < 1, x > 0$

C. $\mu_r > 1, x < 0$

D. $\mu_r > 1x > 0$

Answer: B

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15. If the anglular momentum of an electron is J then the magnitude of the magnetic moment will be

A. $\frac{ej}{m}$

B. $\frac{ej}{2m}$

C. $ej2m$

D. $\frac{2m}{ej}$

Answer: B

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16. Liquid oxygen remains suspeded two poles of a magnet because it is

A. diamagnetic

B. paramagnetic

C. ferromagnetic

D. antiferromagnetic

Answer: B

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17. When a pieace of a ferromagnetic substance is put a uniform magnetic field the flux density inside it is 4 times the flux density

away from the piece. the magnetic permeability of the material is

A. 1

B. 2

C. 3

D. 4

Answer: D

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18. Two identical magnetic dipoles of magnetic moments $1.0Am^2$ each placed at separation of 2 m with their axes perpendicualr to each other field at a point midway between the dipoles is

A. $5 \times 10^{-7}T$

B. $\sqrt{5} \times 10^{-7}T$

C. $10^{-7}T$

D. none of these

Answer: B

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19. Tow identical short bar magnets each having magnetic moment m are placed a distance of 2d apart with axes perpendicualr to each other a horizontal plane the magnetic inlduciton at point midway between them is

A. $\frac{\mu_0}{4\pi}\sqrt{2}\frac{M}{d^3}$

B. $\frac{\mu_0}{4\pi}\sqrt{3}\frac{m}{d^3}$

C. $\frac{2\mu_0}{\pi}\frac{m}{d^3}$

D. $\frac{\mu_0}{4\pi}\sqrt{5}\frac{m}{d^3}$

Answer: D

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20. Two small magnets each of magnetic moment $10Am^2$ are placed in end on position 0.1m apart from their centres. The force acting between them is

A. 0.6×10^7 N

B. 0.6 N

C. $0.006 \times 10^9 N$

D. north of these

Answer: B

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21. A short bar magnet with its nroth pole facing north forms a neutral point at p in the horizontal plane if the magmnet is rotated by 90° the net magnetic inductino at P is

A. 0

B. $2B_H$

C. $\frac{\sqrt{5}}{2}B_H$

D. $\sqrt{5}B_H$

Answer: D

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22. A bar magnet has coercivity $4 \times 10^3 Am^{-1}$ it is desired to demagnetise it by inserting it inside a solenoid 12cm long and has 60 turns.

the current that should be sent through the solenoid is

A. 2a

B. 4a

C. 6a

D. 8a

Answer: C

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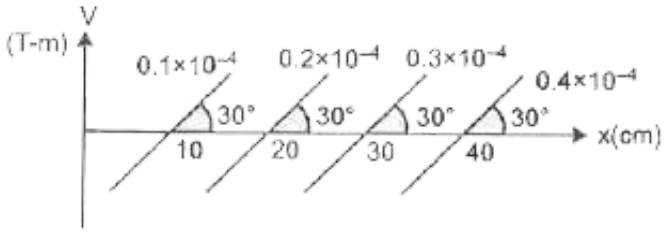
23. Some equipotential surface of the magnetic scalar potential are magnetic field at a point in the region is



A. $10^{-4}T$

B. 2×10^{-4}

C. $0.5 \times 10^{-4}T$

D. none of these

Answer: B

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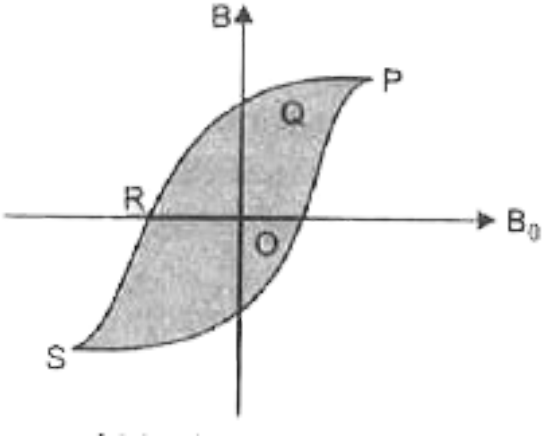
24. The illustrates how B the flux density inside a sample of unmagnetised ferromagnetic material varies is kept for the sample to be suitable for making a permanent magnet



A. OQ should be large OR should be small

B. OQ and OR should be large

C. OQ should be small and OR should be large

D. OQ and OR should both be small

Answer: B

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25. A compass needle of magnetic moment 60 Am^2 pointing geopgraphical north at a place where the horizontal component of earth fiedl is 40 μWbm^{-2} experiences a torque of 1.2×10^{-3} Nm the declination of the place is

A. 30°

B. 45°

C. 60°

D. 25°

Answer: A

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26. An electron moving aroung the nucleus with an angular momentum l has a magnetic moment

A. $\frac{e}{m}l$

B. $\frac{e}{2m}l$

C. $\frac{2e}{m}l$

D. $\frac{e}{2\pi m}$ l

Answer: B

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27. A toroid of n turns mean radius R and sectional radius a carriers current I it is placed on a horizontal table taken as x-y plane its magnetic moment m

A. is non zero and points in the z directin buy symmetry

B. points along the axis of the tortoid

C. is zero otherwise there would be a field falling as $\frac{1}{r^3}$ at alrge distance outside the toroid

D. is pointing radially outwards

Answer: C

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28. The magnetic field of earth can be modelled by that of a point placed at the centre of the earth the dipole axis makes an

angle of 11.3° with the axis of earth at mumbai declination is nearly zero then

A. the declination variis between 11.3° w to 11.3° e

B. the least declination is 0°

C. the plane defoned by dipole axis and earth axis passes throgh green wich

D. declination averaged over eath must be always negative

Answer: A

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29. A paramagentic sample shows a net magnetization of $8Am^{-1}$ when placed in an external magentic field of 0.6 T at a temperature of 4 k .When the same sample is placed in a external magnetic field of 0.2 T at temperature of 16 K . The magnetization will be .

A. $\left(\frac{32}{3}\right)Am^{-1}$

B. $\frac{2}{3}Am^{-1}$

C. $6Am^{-1}$

D. $2.4Am^{-1}$

Answer: B

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30. A long solenoid has 1000 per meter and carries a curretn of 1A it has a soft iron core of μ_r =1000 the core is heated beyond the curie temperature T_c

A. the h field in the solenoid is unchanged but the b field decreases drasticaly

B. the h and b fields in the solenoid are nearly unchanged

C. the magnetisation in the core reverse direction

D. the magnetisation in the core diminishes by a factor of about 10^8

Answer: A::D

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31. Essential difference between electrosatic shielding by a conducting shel and magnetiostatic shielding id due to

A. electrostatic field lines can end on charge and conductors have free charges

B. lines of b canalso end but conductors cannot end them

C. lines of b cannot end on any material and perfect shielding is not possible

D. shells of high permeability materials can be used to divert lines of b from the interior region

Answer: A::C::D

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32. Let the magnetic field on earth be modelled by that of a point magnetic dipole at the centre of earth the angle of dip at a point on the geographical equator

A. is always zero

B. can be zero at specfic points

C. canbe positive or negative

D. is bounded

Answer: A::C::D

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33. In certain place H=$\frac{1}{\sqrt{3}}$ v the angle of dip at this place is

A. 0

B. $\pi/6$

C. $\pi/3$

D. $\pi/4$

Answer: B

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34. At the magnetic north pole of the earth the value of the horizontal component of earth 's magnetic field and angle of dip are respectively

A. zero maximum

B. maximum , minimum

C. maximum , maximum

D. minimum , minimum

Answer: A

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35. A bar magnet 8 cm long is placed in the magnetic meridian with the n pole pointing towards geographical north. two neutral points seperated by a distance of6cm are on equatorial axis of magnet. if horizontal componetn of earth 's field $=3.2 \times 10^{-5}$ T then pole strength of magnet is

A. 5 ab -amp $\times$ cm

B. ab - amp $\times$ cm

C. 2.5 ab -amp $\times$ cm

D. 20 ab -amp $\times$ cm

Answer: A

Watch Video Solution

36. A dip circle is so set that its needle move freeely in the magnetic merdian inthis position the angle of dip is 40° with the magnetic meridian in th this position the needle will dip by an angle

A. 40°

B. 30°

C. more than 40°

D. less than 40°

Answer: D

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37. Two identical magnetic dipole of magnetic moments $1.0Am^2$ each placed at a separation

of 2m with the resultant magnetic field at point midway between the dipole is

A. $5 \times 10^{-7} T$

B. $\sqrt{5} \times 10^{-7} T$

C. $10^{-7} T$

D. 2×10^{-7} T

Answer: B

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38. If a magnetic substance is kept in a magnetic field then which of the following substance is thrown out

A. paramagnetic

B. ferromagnetic

C. diamagnetic

D. antiferromagnetic

Answer: C

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39. A superconductor exhibits perfect

A. ferrimagnetism

B. ferromagnetic

C. diamagnetic

D. antiferromagnetic

Answer: D

 Watch Video Solution

40. A frog can jump higher than nmormal in a magnetic field because the tissues of a frog are

A. paramagnetic

B. diamagnetic

C. ferro magnetic

D. antferro magnetic

Answer: B

Watch Video Solution

41. In the bhysteresis cycle the value of H needed to makle the intensity of magnetisation zero is called

A. retentivity

B. coercive force

C. lorentz force

D. none of the above

Answer: B

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42. A dipole is palced parallel to the electric field if W is the work done in rotating the dipole by 60° then work done in rotating it by 180° is

A. 2w

B. 3w

C. 4w

D. $\frac{w}{2}$

Answer: C

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43. If the magnetic dipole moment of an atom of dimagnetic material paramagnetic material and ferromagnetic material are denoted by $\mu_d \mu_p$ and μ_f respectively then

A. $\mu_d = 0$ nad $\mu_p \neq 0$

B. $\mu_d \neq 0$ and $\mu_p = 0$

C. $\mu_p = 0$ and $\mu_f \neq 0$

D. $\mu_d \neq 0$ and $\mu_f \neq 0$

Answer: A

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44. What is the magnitude of the equatorial and axtal feilds due to a bar magnet of length 5.0 cm at a distance of 50 cm from its mid-point? The magnetic moment of the bar magnet is $0.40Am^2$

A. $b_{eq} = 3.2 \times 10^{-7}T$

B. $B_{ax} = 3.2 \times 10^{-7}T$

C. $B_{eq} = 4TB_{ax} = 2T$

D. $B_{ax} = 2TB_{eq} = 4T$

Answer: A

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45. A bar magnet has a magnetic moment of $2.5JT^{-1}$ and is placed in a magnetic field of 0.2 T. Work done in turning the magnet from parallel to antiparallel position relative to field direction is

A. 0.5 j

B. 1 j

C. 2.0 j

D. zero

Answer: B

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46. A bar magnet is placed north south with its nort pole due north the points of zero

magnetic field will be in which direction from centre of magnet

A. north and south

B. east and west

C. north east and south west

D. north east and south east

Answer: B

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47. A vertical circular coil of radius 0.1 m and having 10 turns carries a steady current. When the plane of the coil is normal to the magnetic meridian, a neutral point is observed at the centre of the coil. If $B_H = 0.314 \times 10^{-4} T$. The current in the coil is

A. 0.5 A

B. 0.25 A

C. 2A

D. 1A

Answer: A

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48. The incorrect statement regarding the lines of force of the magnetic field B is

A. magnetic intensity is a measure of lines of force passing through unit area held normal

B. magnetic lines of force form a close curve

C. inside a magnet its magnetic lines of force move from north pole of magnet towards its south pole

D. due to a magnet magnetic lines of force never cut each other

Answer: C

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49. The earth magnetic induction at certain point is 7×10^{-5} this is to be annulled by the magnetic radius 15 cm the required curretn in the loop is

A. 0.56 A

B. 5.6 A

C. 0.28 A

D. 2.8 A

Answer: B

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50. A particle of charge q and mass m moves in a circualr orbit of radius r either anglular speed ω the ratio of the magnitude of its magnetic moment to that of its angular momentum depends on

A. ω and q

B. ω q and m

C. q and m

D. ω and m

Answer: C

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Multiple Choice Question Level Iii

1. Two short bar mangets of length 1 cm each have magnetic moments 1.20 and 1.00 am^2 respectively they have a common magnetic value of the resultant horizontal magnetic induction at the mid point O of the line joining their centre is close to

A. $2.56 \times 10^{-4} wb/m^2$

B. $3.50 \times 10^{-4} - wb/m^2$

C. $5.80 \times 10^{-4} wb/m^2$

D. $3.6 \times 10^{-5} wb/m^2$

Answer: A

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2. The coercivity of a small magnet where the ferromagnet gets demagnetized is $3 \times 10^3 am^{-1}$ the current required to be

passed in a solenoid of length 10 cm and number of turns 100 so that the magnet gets demagnetized when inside the solenoid is

A. 6A

B. 30 mA

C. 60 mA

D. 3A

Answer: D

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Recent Competitive Question

1. A gyromagnetic ratio of the electron revolving in a circular orbit of hydrogen atom is $8.8 \times 10^{10} C kg^{-1}$. What is the mass of the electron? Given charge of the electron $= 1.6 \times 10^{-19} C$.

A. $1 \times 10^{-19} c$

B. 0.1×10^{-29} kg

C. $1.1 \times 10^{-29} kg$

D. $1/11 \times 10^{-29} kg$

Answer: D

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2. A susceptibility of a certain magnetic material is 400. What is the class of the magnetic material?

A. diamagnetic

B. paramagnetic

C. ferromagnetic

D. ferroelectric

Answer: C

Watch Video Solution

3. Core of electromagnets are made of ferromagnetic material which has

A. high permeability and high retentivity

B. low permeability and low retentivity

C. high permeability and low retentivity

D. low permeability and high retentivity

Answer: C

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4. If there is no torsion in the suspension thread, then the time period of a magnet executing SHM is

A. $T = \frac{1}{2\pi}\frac{\sqrt{I}}{MB}$

B. $T = 2\pi\frac{\sqrt{MB}}{I}$

C. $T = \frac{1}{2\pi}\frac{\sqrt{MB}}{I}$

D. $T = 2\pi\frac{\sqrt{I}}{MB}$

Answer: D

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5. The magnetic susceptibility of a paramagnetic material at is 0.0075 and its value at will be

A. 0.003

B. 0.0075

C. 0.0045

D. 0.015

Answer: D

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