PHYSICS

BOOKS - DC PANDEY ENGLISH

MAGNETISM AND MATTER

Example

1. Consider a sort magnetic dipole o f magnetic length 10cm. Find its geometric length.

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2. A thin bar magnet of length 2L is bent at the mid-point so that the angle between them is 60°. The new length of the magnet is

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3. A steel wire, of length l has a magnetic moment M. Its is then bent into a semi-circular arc. The new magnetic moment is

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4. Two magnetic poles, one of the which is four times stronger than the other, exert a force of 10gf on each other when placed at a distance of 20cm. Find the strength of each pole.

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5. Two similar magnetic poles, having pole strengths in the ration 1:3 and placed 1m apart. Find the point where a unit pole

experiences no net force due to these two poles

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6. Find the magnetic field due to a dipole of magnetic moment $3Am^2$ at a point 5m away from it in the direction making angle of 45° with the dipole exists

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7. A bar magnet of length 0.1m has pole strength of 50A-m. Calculate the magnetic field at distance of 0.2m from tis centre on

(i) its axial line and (ii) it equatorial line.

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8. Calculate the magnetic induction at a point 1 away from a proton, measured along its axis of spin. The magnetic moment of the proton is $1.4 \times 10^{-26} A - m^2$

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9. A short bar magnet has a magnetic moment of $0 \cdot 48JT^{-1}$. Give the direction and magnitude of the magnetic field produced by the magnet at a distance of $10cm$ from the centre of the magnet on (i) the axis (ii) the equatorial line (normal bisector) of the magnet.

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10. A current of 6A is flowing through a 20 turns circular coil of radius 5cm.The coil lies in the xy-plane. What is the magnitude and direction of the magneitc dipole moment assocaited with it?

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11. A current I flows in a conducting wire of lenth L. If we bent it in a circular form, then calculate its magnetic dipole moment.

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12. The electron in hydrogen atom moves with a speed of $2.2 \times 10^{6} m / s$ in an orbit of radius $5.3 \times 10^{-11} cm$. Find the magnetic moment of the orbiting electron.

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13. A closely wound solenoid of 800 turns and area of cross section $2 \cdot 5 \times 10^{-4} m^{2}$ carries a current of $3 \cdot 0 A$. Explain the sense in which

the solenoid acts like a bar magnet. What is its associated magnetic moment?

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14. A magnetic of magnetic moment placed along the X-axis in an magnet field .Find the torque acting on the magnetic field

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15. A bar magnet when placed at an angle of 30° to the direction of magnetic field of 5×10^{-2}T, experiences a moment of couple 2.5×10^{-6}. If the length of the magnet is 5cm, then what will be its pole strength?

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16. The work done in turning a magnet of magnetic moment 'M' by an angle of 90° from the meridian is 'n' times the corresponding

work done to turn it through an angle of 60°, where 'n' is given by

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17. A bar magnet of magnetic moment 2.0 $A-m^2$ is free to rotate about a vertical axis through its centre. The magnet is released from rest from the east west position. Find the kinetic energy of the magnet as it takes the north south position. The horizontal component of the earth's magnetic field as

$B = 25\mu T$. Earth's magnetic field is from south to north.

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18. A short bar magnet of moment $0 \cdot 32JT^{-1}$ is placed in a uniform external magnetic field of $0 \cdot 15T$, if the bar is free to rotate in the plane of the field, which orientations would correspond to its, (i) stable and (ii) unstable equilibrium? What is the potential energy of the magnet in each case?

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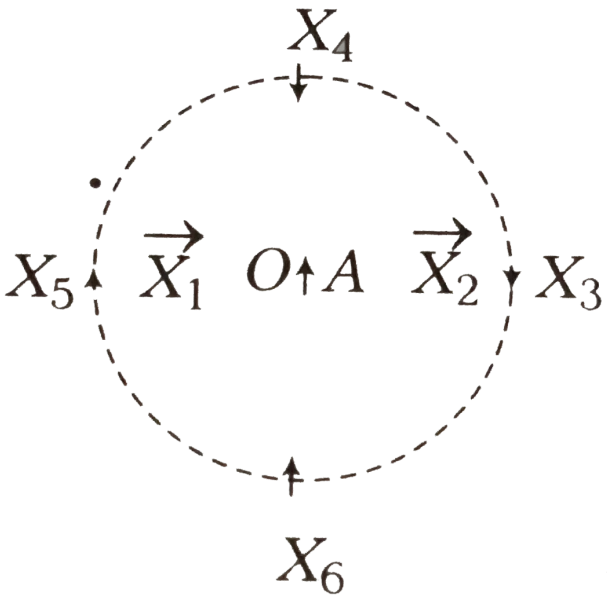
19. Consider the situation shown in the diagram, where A small magnetised needle A is placed at a centre marked, as O. The direction of its mangetic moment I s indicated by arrow. The other arrow show different position (and orientations of the magnetic moment) of antoher identical magnetised eedle X.

In which configuration the system is not in equlibrium?

(ii) In which configuration is the system in (a)

stable and (b) unsable equilibrium

(iii) Which configuration corresponds to the lowest potentials energy among all the configuration shown



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20. A magnetic needle is free to oscillate in a uniform magnetic field as shown in the figure. The magnetic moment of magnetic needle $7.2Am^2$ and moment of inertia $I = 6.5 \times 10^{-6}kgm^2$. The number of oscillation performed in 5s are 10. Calculate the magnitude of magnetic field?

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21. A compass needle whose magnetic moment is $60Am^2$ pointing geographical north at a certain place where the horizontal component of earth's magnetic field is $40 \times 10^{-6}Wbm^{-2}$ experiences a torque of $1.2 \times 10^{-3}Nm$. The declination of the place is

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22. In the magnetic meridian of a certain place, the horizontal component of earth's magnetic

fied is $0.26G$ and the dip angle is 60°. Find

a. Vertical component of earth's magnetic field

b. the net magnetic field at this place

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23. The horizontal and veritical components of eaths's field at a place ar 0.22 gauss of 0.38 gauss, respectively. Calculate the angle of dip and resultant intensity of earth's field.

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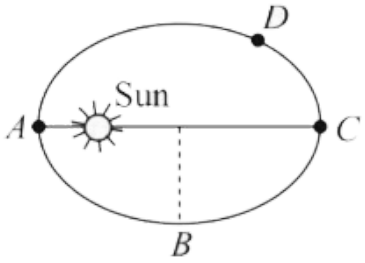
24. A planet revolves around the sun in an elliptical orbit. The linear speed of the planet will be maximum at:



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25. A magnetic needle suspended in a vertical plane at 30° from the magnetic meridian

makes an angle of 45° with the horizontal. Find the true angle of dip.

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26. A ship is to reach a place of 10° south of west. In which direction should it be steered if the declination at the place is 18° west of north.

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27. A dip circle shows an apparent dip of 45° at a place where the true dip is 30° . If the dip circle is rotated through 90°, what apparent dip will it show?

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28. A short magnet $\left(M = 4 \times 10^{-2}\right)$ lying in a horizontal plane with its north pole points 37° east of north. Find the net horizontal field

a ta point of the magnet of 0.1m away from it

$(B_h = 11\mu T)(\sin 37^\circ = 3/5, \cos 37^\circ = 4/5)$

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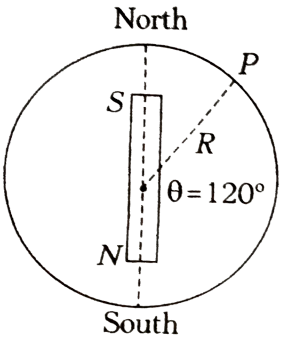
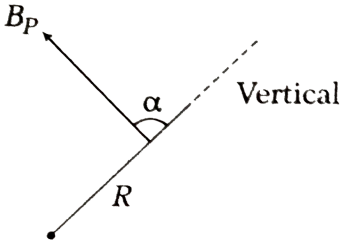
29. The earth's magnetic field at geomagnetic poles has a magnitude $8 \times 10^{-5} T$. Find the magnitude and the direction of the field at a point on the earth's surface where the radius makes an angle of 120° with its axis of the earth's assumed magnetic dipole. What is the

inclination dip at this point?





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30. A bar magnet $30cm$ long is placed in magnetic meridian with its north pole pointing south. The neutral point is observed at a distance of $30cm$ from its centre. Calculate the pole strength of the magnet.

Given horizontal component of earth's field is $0 \cdot 34G$.

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31. A short bar magnet is placed with its north pole pointing north. The neutral point is $10cm$ away from the centre of the magnet. If $H = 0.4G$, calculate the magnetic moment of the magnet.

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32. In a tangent galvanometer, when a current of $10mA$ is passed, the deflection is 31°. By what percentage, the current has to be increased, so at to produce a deflection of 42° ?

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33. The coil of a tangent galvanometer of radius 12cm is having 200turns. If the horizontal component of earth's magnetic

field is $25\mu T$. Find the current which gives a deflection of 60°.

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34. A bar magnet of length 5cm, width 3cm and height 2cm takes 5s to complete an oscillation in viberation magnetometer placed in a horizontal magnetic field of $20\mu T$. The mass of this bar magnet is 250g(a). Find the magnetic moment of the magnet. (b) If the magnet is put in the magnetormer with its

0.5cm edge horizontal, what would be the new time period?

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35. A magnetic needle performs 20 oscillations per minute in a horizontal plane. If the angle of dip be 30°, then how many oscillation per minute will this needle perform in vertical, north south plane and in vertical east -west plane?

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36. A magnet performs 15 oscillations per minute in a horizontal plane, where angle of dip is 60° and earth is total field is 0.5G. At another place, where total field is 0.6G, the magnet performs 20 Oscillation per minutes. What is the angle of dip at this place.

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37. The time period of viberation of two magnets in sum position (magnets placed

with similar poles on one sides one above the other) is 3s. When polarity of weaker magnet is reversed the combination makes 12 oscillations per minutes. What is the ratio of magnetic moments of two magnets?

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38. A small bar magnet having a magnitic moment of $9 \times 10^{-3} Am^{-2}$ is suspended at its centre of gravity by a light torsionless string at a distance of $10^{-2} m$ vertically above

a long, straight horizontal wire carrying a current of 1.0A from east to west. Find the frequency of oscillation of the magnet about its equilibrium position. The moment of inertia of the magnet is $6 \times 10^{-9} kgm^2$.($H = 3 \times 10^{-5} T$).

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39. 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 ratio $\frac{T'}{T}$ is

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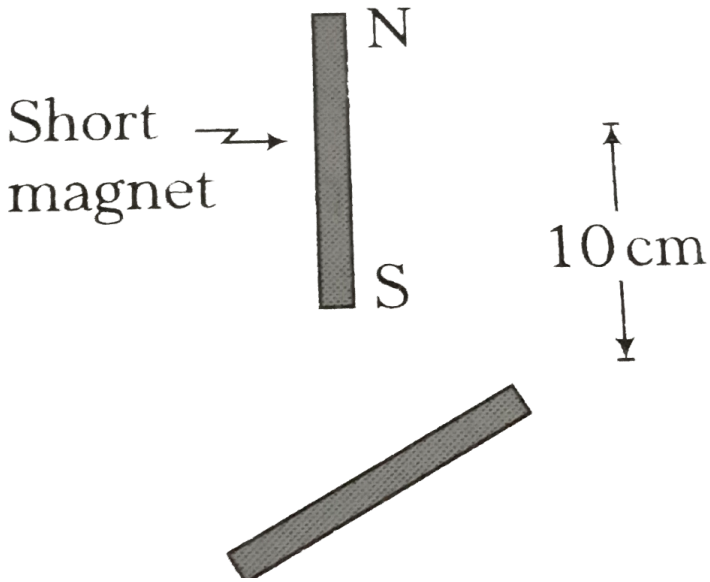
40. The time period of the magnetic in an oscillation pmagnetometer in the earth magnetic field is 2s. A short bar magnet is placed to the north of the magnetometer, at a separation 10cm from the oscillation magnet,

with its north pole pointing towards north. The time period beceomes half. Calculate the magnetic moment of this short magnet.



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41. The magnetic moment of a magnet $(15cm \times 2cm \times 1cm) is 1.2A - m^2$. Calculate its intensity of magnetisation

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42. Relative permeability of iron is 5500, then its magnetic susceptibility will be

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43. The magnetic field of 20CGS units produces of a flux of 2400 CGS units in a bar of cross section $0.2cm^2$ Calculate the (i) permeability and (ii) susceptibility of the bar.

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44. A solenoid having 2000 turns/m has a core of a material with relative permeability 220. The area of core is $4cm^2$ and carries a current of 5A. Calculate (a) Magnetic intensity (b)

Magneic field (c) Magnetisation (I) of the core

Also calculate the pole strength developed.

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45. The space within a current carrying solenoid is filled with magneisum having magnetic suscepitbiliy. $x = M_g = 1.2 \times 10^{-5}$. What will be the percentage increase in magnetic field?

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46. Consider a bar magnet having pole strength 2A-m, magnetic length 4cm and area of cros-section $1cm^2$ Find

(I) the magnetisation I

(II) the magneic intensity H and

(III) the magnetic field at the centre of magnet

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47. The magnetic susceptibility of a paramagnetic material at $-73^\circ C$is0.0075, its value at $-173^\circ C$ will be

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48. A solenoid having 5000 turns/m carries a current of 2A. An aluminium ring at temperature 300K inside the solenoid provides the core, (a) If the magnetisation I is $2 \times 10^{-2} \frac{A}{m}$. Find the susceptibility of aluminium at 300K (b) If temperature of the aluminium ring is 320K, what will be the magnetisation ?

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49. The hysteresis loss for a specimen of iron weighing 15kg is equivalent at $300 Jm^{-3} cyc \leq^{-1}$ Find the loss of energy per hour at 25 cycle s^{-1}. Density of iron is $7500 kgm^{-3}$

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50. The coercive force for a certain permanent magnet is $4.0 \times 10^4 Am^{-1}$. This magnet is placed inside a long solenoid of 40 turns/cm

and a current is passed in the solenoid to demagnetize it completely. Find the current.

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1. Magnetic length is

A. less than geometric length

B. equal to geometric length

C. greater than geometric length

D. none of these

Answer:

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2. Magnetic lines of force due to a bar magnet do not intersect because

A. a point is always has a single net magnetic field

B. the line is always diverge from a single point

C. the is always diverge froma single point

D. none of these

Answer:

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3. SI unit of magnetic pole strength is

A. A-m

B. $A - m^{-1}$

C. $A - m^{-2}$

D. $A - m^{2}$

Answer:

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4. A bar magnet of magnetic moment M_1 is axially cut into two equal parts. If these two pieces are arranged perpendiucular to each

other, the resultant magnetic moment is M_2.

Then the vale of $\frac{M_1}{M_2}$ is

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

B. 1

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

D. $\sqrt{2}$

Answer:

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5. At a point on the right bisector of a magnetic dipole, the magnetic

A. potential varies as $1/r^2$

B. potential is zero at all points on the right bisector

C. field varies as r^2

D. field is perpendicular to the axis of dipole

Answer:

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6. The ratio of the magnetic fields due to small bar magnet in end position and on broad side position is (at equal distance from the magnet)

A. $1/4$

B. $1/2$

C. 1

D. 2

Answer:

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7. Two solenoids acting as short bar magnets P and Q are arranged such that their centres are on the X-axis and are separated by a large distance. The magnetic axes of P and Q are along X and Y-axes, respectively. At a point R, midway between their centres, if B is the magnitude of induction due to Q , then the

magnitude of total induction at R due to the magnitude is

A. 3B

B. $\sqrt{B}$

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

D. B

Answer:

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8. The intensity of magnetic field due to an isolated pole of strength m at a pont distant r from it will be proportional to

A. $\frac{m}{r^2}$

B. mr^2

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

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

Answer:

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9. A particle of charge q and mass m moves in a circular orbit of radius r with angular speed ω. The ratio of the magnitude of its magnetic moment to that of its angular momentum depends on

A. $-\frac{q}{2m}$

B. $\frac{q\omega r^2}{2}$

C. $\frac{q\omega}{2mr^2}$

D. $\frac{q\omega r^2}{2m}$

Answer:

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10. A bar magnet of magnetic moment $\vec{M}$ is placed in a magnetic field of induction $\vec{B}$. The torque exerted on it is

A. $M \times B$

B. $-B.M$

C. M.B

D. M+B

Answer:

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11. The couple acting on a magnet of length 10cm and pole strength 15A-m, kept in a field of $B = 2 \times 10^{-5}$, at an angle of 30° is

A. $1.5 \times 10^{-5} N - m$

B. $1.5 \times 10^{-3} N - m$

C. $1.5 \times 10^{-2} N - m$

D. $1.5 \times 10^{-6} N - m$

Answer:

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12. A bar magnet is held at a right angle to a uniform magnetic field. The couple acting on the magnet is to be halved by rotating it from the position. The angle of rotation is

A. 60°

B. 45°

C. 30°

D. 75°

Answer:

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13. If a bar magnet moment M is freely suspended in a uniform magnetic field of strength field of strength B, then the work done in rotating the magent through an angle θ is

A. $MB(1-\sin\theta)$

B. $MB\sin\theta$

C. $MB\cos\theta$

D. $MB(1-\cos\theta)$

Answer:

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14. The effect due to uniform magnetic field on a freely suspended magnetic needle is as follows

A. Both torque and net force are present

B. torque is present but no net force

C. Both torque and net force are absent

D. net force is presetn but not torque

Answer:

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15. The net magnetic flux through any closed surface, kept in a magnetic field is

A. zero

B. $\frac{\mu_0}{4\pi}$

C. $4\pi\mu_0$

D. $\frac{4\mu_0}{\pi}$

Answer:

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5 2

1. The earth's magnetic field is

A. $10^{-4}T$

B. $10^{-5}T$

C. $10^{-6}T$

D. None of these

Answer:

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2. Magentic meridian is a

A. point

B. horizontal plane

C. veritcal plane

D. line along N-S

Answer:

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3. The angle between the magnetic merdian and geographical merdian is called

A. angle of dip

B. angle of declination

C. magnetic moment

D. power of magnetic field

Answer:

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4. The angle of dip at the magnetic equator is

A. 0°

B. 30°

C. 60°

D. 90°

Answer:

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5. Earth's magnetic field always has a horizontal component except at

A. magnetic equator

B. magnetic pole

C. geographical north pole

D. everywhere

Answer:

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6. If $H = \frac{1}{\sqrt{3}}V$, then find angle of dip. (where symbols have their usual meaning)

A. 60°

B. 30°

C. 45°

D. 90°

Answer:

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7. Let V and H be the vertical and horizontal components of earth's magnetic field at any point on earth. Near the north pole

A. $V > > H$

B. $V < < H$

C. V=H

D. V-H-0

Answer:

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8. If a magnet is suspended an angle 30° to the magnetic field at any point on eath. Near the north pole.

A. $\tan^{-1}(\sqrt{3}/2)$

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

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

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

Answer:

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9. The dip at a place is delta. For measuring it, the axis of the dip needle is perpendicular to the magnetic meridian. If the axis of the dip

needle makes angle θ with the magnetic meridian, the apparent dip will be given $\tan \delta_1$ which is equal to:

A. $\tan \delta \operatorname{cosec} \theta$

B. $\tan \delta \sin \theta$

C. $\tan \delta \cos \theta$

D. $\tan \delta \sec \theta$

Answer:

10. At a neutral point

A. field of magnet is zero

B. field of earth is zero

C. field of magnetic is perpendicular to field to earth

D. none of the above

Answer:

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11. TANGENT GALVANOMETER

A. capacitance

B. current

C. resistance

D. potential difference

Answer:

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12. Two tangent galvanometer A and B are identical except in their number of turns. They are connected in series. On passing a current through them, deflections of 60° and 30° are produced. The ration of the number of turns in A and B is

A. $1:3$

B. $3:1$

C. $1:2$

D. $2:1$

Answer:

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13. Vibration magnetometer is used for comparing

A. magnetic fields

B. earth's field

C. magnetic moment

D. All of these

Answer:

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14. The time period of a freely suspended bar magnet in a field is 2s. It is cut into two equal parts along its axis, then the time period is

A. 4s

B. 0.5s

C. 2s

D. 0.25s

Answer:

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15. A bar magnet suspended freely in a uniform magnetic field is vibrating with a time period of 3s. If the field strength is increased to 4 times of the earlier field strength, then the time period (in second) will be

A. 12

B. 6

C. 1.5

D. 0.75

Answer:

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5 3

1. Which one of the following is a non-magneticsubstance?

A. Iron

B. Nickel

C. Cobalt

D. Brass

Answer: D

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2. What is the SI unit of permeability

A. Am^{-1}

B. A-m

C. $Henrym^{-1}$

D. No unit, it is a dimensionless number

Answer: C

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3. The unit of magnetic susceptiblity is

A. H

B. Wb/m

C. A/m

D. None of these

Answer: D

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4. The relation connecting B, H nad I in SI system is

A. B=H+1

B. B=H-1

C. $B = \mu_0(H + 1)$

D. $b = \mu_0(H - I)$

Answer: C

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5. An example of a diamagnetic substance is

A. aluminium copper

B. copper

C. iron

D. nickel

Answer: B

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6. Out of dia, para and ferromagnetism, the universal property of all substances is

A. diamagnetism

B. ferro magnesium

C. paramagnetic

D. all of these

Answer: A

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7. The magnetic susceptibility is negative for

A. diamagnetism materials

B. Paramagnetic materials

C. Ferromagnetic materials

D. all of these

Answer: A

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8. Identify the paramagnetic substance

A. Iron

B. Aluminium

C. Nickel

D. Hudrogen

Answer: B

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9. Which of the following is true?

A. Diamagnetism is temperature dependent

B. Paramagnetism is temperature dependnt

C. Paramagnetism is magnetic independent

D. None of these

Answer: B

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10. Magenetic permeability is maximum for

A. diamagnetic substance

B. paramagnetic substance

C. inversion temperature

D. all of these

Answer: C

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11. Temperature above which a ferromagnetic substance becomes paremagnetic is called

A. neutral temperature

B. Curie temperature

C. inversion temperature

D. critical temperature

Answer: B

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12. Substance in which the magnetic moment of a single atom is not zero, is know as

A. diamagnetism

B. ferromagnitism

C. Paramagnetism is magnetic independent

D. ferrimagneitsm

Answer: C

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13. Liquid oxygen remains suspended between two pole faces of a magnet because it is

A. diamagnetic

B. paramagnetic

C. ferromagnetic

D. antiferromagnetic

Answer: B

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14. The only property possessed by ferromagnetic substance is

A. hysteresis

B. susceptiility

C. directional property

D. attracting magnetic substances

Answer: A

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15. The permanent magnet is made fron which one of the following substances?

A. diamagnetic substance

B. Paramagnetic

C. Ferromagnetic

D. Electromagnetic

Answer: C

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Medical Gallery

1. A bar magnet is hung by a thin cotton thread in a uniform horizontal magnetic field and is in equilibrium state. The energy required to rotate it by 60 is W. Now the torque required to keep the magnet in this new position is

A. $\frac{W}{\sqrt{3}}$

B. $\sqrt{3}W$

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

D. $\frac{2W}{\sqrt{3}}$

Answer: B

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Others

1. A magnet is placed in iron poweder and the taken out , them maximum iron powder is at

A. some distannce away from north pole

B. some distance away from north pole

C. the middle of the magnet

D. the end of the magnet

Answer: D

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2. A permanet magnet

A. attracts all substance

B. attracts only magnetic substance

C. attracts magnetic substance and repels all non-magnetic substances

D. attracts non-magnetic substances and repels magnetic substances

Answer: B

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3. Magnetic field is measured by

A. pyrometer

B. hydrometer

C. thermometer fluxmeter

D.

Answer: D

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4. Lines which represent places of constant angle of dip are called

A. isoclinic line

B. isogonic line

C. isoclinic lines

D. isodynamic lines

Answer: C

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5. A line passing through places having zero value of magnetic dip is called

A. isoclinic line

B. agonic line

C. isogonic line

D. aclinic line

Answer: D

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6. A clinic lines are the lines joining places of

A. zero dip

B. equal dip

C. zero declination

D. equal declination

Answer: A

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7. The arms of a deflection magnetometer in the tan B posittion are placed

A. east-west

B. north- south

C. north-east

D. south- west

Answer: B

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8. IF the current is doubled, the deflection is also doubled in

A. a tangent galvanometer

B. a moving coil galvanometer

C. Both (a) and (b)

D. None of the above

Answer: B

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9. Which of the following is diamagetic ?

A. Aluminium

B. Quartz

C. Nickel

D. Bismuth

Answer: D

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10. The permeablitiy of paramgentic substance is

A. slinght more than vacuum

B. slight less than vacuum

C. much more than vaccum

D. None of the above

Answer: A

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11. What are the SI units of magnetic field induction or magnetic flux density?

A. tesla

B. $weber / meter^2$

C. newton / ampere-meter

D. All of these

Answer: D

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12. Magnetic field intensity is defined as

A. magnetic moment per unit volume

B. magnetic indction force acting ona unit magnetic pole

C. number of lines of force crossing per unit area

D. number of lineas of forces corssing per unit volume

Answer: C

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13. Permeability is defined as the ratio between

A. magnetic induction and susceptibility

B. magnetic indction and magnetising field

C. magnetising field and magnetic induction

D. magnetising field and magnetic induction

Answer: B

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14. Hysteresis loss for steel is ..... .that for iron.

A. lesser than

B. equal to

C. greater than

D. Either (b) and (c)

Answer: C

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15. Heteropycnosis is exhibited by

A. parmagnetic

B. ferromagnetic

C. diamagentic

D. All of these

Answer: B

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16. Which of the following materials has got the maximum retentvity ?

A. Copper

B. Zinc

C. Soft iron

D. Hard iron

Answer: C

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17. The area enclosed by a hysteresis loop is a measure of

A. retentivity

B. susceptibility

C. permeability

D. energ loss per cycle

Answer: D

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18. Which of the following is the most suitable mateial for making permanent magnet ?

A. Steel

B. Soft iron

C. Copper

D. Nickel

Answer: A

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19. The materials suitable for making electromagnets should have

A. high retentivity and high corecivity

B. low retentivity and low coerivity

C. high retentivity and low coercivity

D. low retenivity and high corecivity

Answer: C

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20. Which of the following is most suitable for the core of electromagnets?

A. Iron

B. Steel

C. Soft iron

D. Cu- Ni alloy

Answer: C

21. A magnetic needle is kept in a non uniform magnetic field . It experiences

A. a force and torque

B. a force but not a torque

C. a torque but not a force

D. Neither a tarque nor a froce

Answer: A

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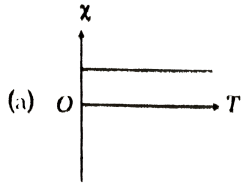
22. The variation of magnetic susceptibility (χ) with temperature for a diamagnetic substance is best represented by

A.



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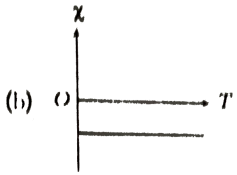
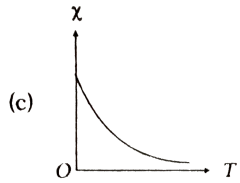
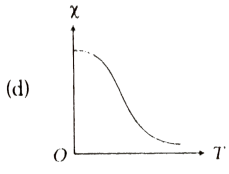


C.



D.



Answer: B

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23. The angle between the earth's magnetic and the earth's geographic axis is

A. zero

B. 11.5°

C. 23°

D. None of the above

Answer: B

 Watch Video Solution

24. If a magnet is hanged with its magnetic axis then it stops in

A. magnetiic meridian

B. geometric meridian

C. angle of dip

D. None of the above

Answer: A

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25. A dip circle is placed perpendicular to the magnetic meridian then thte magnetic needle will aligh

A. vertical

B. horizontal

C. in any direction

D. at an angle of dip to the horizontal

Answer: A

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26. A dip circle is at right angles to the magnetic meridian. What will be the apparent dip ?

A. (a) 0°

B. (b) 30°

C. (c) 60°

D. (d) 90°

Answer: D

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27. A compose needle which is allowed to move in a horizontal plane is taken to a geomagnetic pole. It

A. stay in north-south direction only

B. stay in east-west direction only

C. becomes rigid showing no movenent

D. stay in any position

Answer: D

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28. A magnet is placed horizontally on ground with its north pole towards the geographic north pole of the earth. The natural point obtained

A. magnetic axis

B. magnetic centre

C. perpendicular divider of magnetic axis

D. N and S poles

Answer: A

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29. Due to the earth's magnetic field, charged cosmic ray particles

A. require greater kinetic energy to reach the equator than pole

B. require less kinetic energy to reach the equator than pole

C. can never reach the pole

D. can never reach the quator

Answer: C

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30. A magnetic needle suspended horizontally by an unspun silk fibre, oscillates in the horizontal plane because of the restoring force originating mainly from

A. the torsion of the silk fibre

B. the force of gravity

C. the horizontal componet of earth's magnetic field

D. All of these

Answer: C

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31. An electron moving around the nucleus with an angular momenturm 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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32. A vibration magnetometer is placed at the south pole, then the time period will be

A. zero

B. infinity

C. same as at magnetic equator

D. same as at any other place on earth

Answer: B

 Watch Video Solution

33. Which of the following statements are ture about the magnetic susceptibility $\chi(m)$ of paramagnetic substance?

A. Value of χ_m is respectively proportional to the absolute temperature of the sample

B. χ_m is positive at all temperature

C. χ_m is negative at all temperature

D. χ_m does not depends on the temperature of the sample

Answer: A::B

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34. The angle which the total magnetic field of earth makes with the surface of the called

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35. Resultant force acting on a diamagentic material in a magnetic field is in direction

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36. The mathematical equation for magnetic field lines of force is

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37. Two lines of force due to a bar magnet

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38. What is happens to the force between magnetic poles when their pole strenght and

the distance between them both gets doubled ?

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39. If a magnet of pole strenth m is divided into four parts such that the length and width of each part is half that of initial one, then the pole strength of each part will be

A. $m/4$

B. $m/2$

C. $m/8$

D. 4m

Answer: B

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40. Two magnets have the same length and the same pole strenght . But one of the magnets have a small hole at its centre. Then

A. Both have equal magnetic moment

B. One with hole has smaller magnetic moment

C. One with hole has larger magnetic moment

D. One with hole loses magnetism through the hole

Answer: B

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41. The magnetic field at a distance d from a short bar magnet in longitudinal and transverse positions are in the ratio.

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42. If a diamagnetic substance is brought near north or south pole of a bar magnet, it is

A. attracted by the poles

B. repelled by the poles

C. attracted by the north pole and repelled by the south pole

D.

Answer: B

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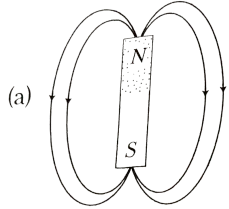
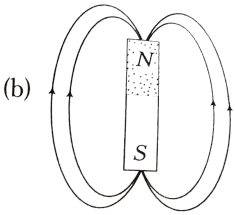
43. The magnet field lines due to a bar magnet are correctly shown in

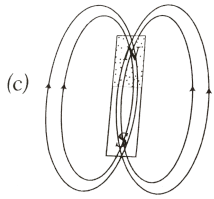
A.



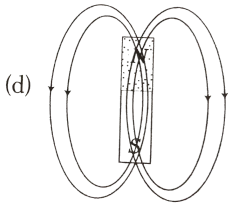
B.



C.



D.



Answer: D

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44. Suscepitbility is positive and large for a

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45. Torques τ_1 and τ_2 are required for a magnetic needle to remain perpendicular to the magnetic fields at two different places. The magnetic field at those places are B1 and B2 respectively, then $\frac{B_1}{B_2}$ is

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46. A dip circle is taken to geomagnetic equator. The needle is allowed to move in a vertical plane perpendicular to the magnetic meridian. The needle will stay

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

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48. When the magnetic inclination (dip) was measured at various places on earth, in one of the following countries it was found to be zero. Which to be zero. Which one was it ?

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49. In a deflection magnetometer, the needle is short and the pointer is long because, the

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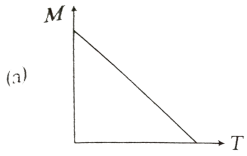
50. A curve between magnetic moment and temperature of magnet is

A.



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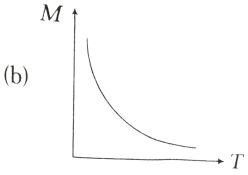

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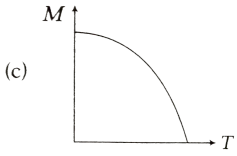
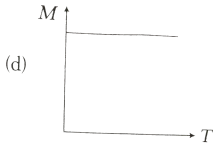


D.



Answer: C

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51. The tangents deflection produced in tan A and B positions by a short magnet at equal distances are in the ratio .

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52. The relative permeability is represented by μ_r and susceptibility is denoted by χ for a

magnetic substance then for a paramagnetic substance.

A.

B.

C.

D.

Answer: D

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53. When a piece of a ferromagnetic sobstance is put in a uniform magnetic field, the flux density inside it is four 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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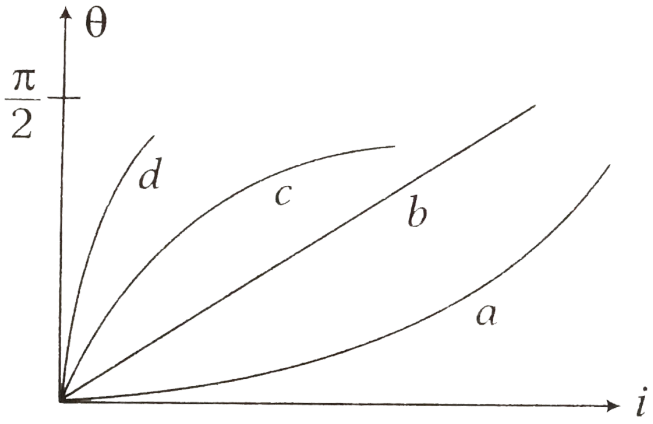
54. Which of the four the graphs may best represent the current-deflection realation in a tangent galvanormetre?



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55. If a diamagnetic solution is poured into a U-tube and one aem of this U-tube placed between the poles of a strong magnet with the meniscus in a line with the field, then the level of the solution will

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56. A paramagnetic liquid is taken in a U-tube and arranged so that one of its limbs is kept between pole pieces of the magnet. The liquid level in the limb

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57. The magnetic moment of a length 10 cm amd pole strenth 4.0 Am will be

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58. All these magnetic materials loss their magnetic properties when

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59. When a ferromagnetic material is heated above its Curie temperature , the material

Watch Video Solution

60. Above the Curie temperature, the susceptility of a ferromagentic substance varies

Watch Video Solution

61. The given figure represents a material which is

A. paramagnetic

B. diamagnetic

C. ferromagnetic

D. none of these

Answer: B

Watch Video Solution

62. A long thin magnet of moment M is bent into a semi circle. The decrease in the magnetic moment is

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63. A magnet of magnetic moment M amd pole strenth m is divided in two equal parts, then magnetic moment of each part will be

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64. Two identical thin bar magnets, each of length L and pole strength m are placed at right angles to each other, with the N pole of one touching the S-pole of the other. Find the magnetic moment of the system.

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65. A short bar magnet pleaced with its axis at 30° with a uniform external magnetic field of 0.16 Tesla expriences a torque of magnitude

0.032 Joule. The magnetic moment of the bar magnet will be

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66. A bar magnet when placed at an angle of 30° to the direction of magnetic field induction of $5 \times 10^{-2}T$, experiences a moment of couple $25 \times 10^{-6}N - m$. If the length of the magnet is 5cm its pole strength is

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67. A bar magnet of magnetic moment $3.0A - m^2$ is placed in a uniform magnetic induction field of $2 \times 10^{-5}T$. If each pole of the magnet experiences a force of $6 \times 10^{-4}N$, the length of the magnet is

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68. A toroid of n turns, mean radius R and cross-sectional radius a carries current I. It is

placed on a horizontal table taken as x-y plane. Its magnetic moment $\overrightarrow{M}$

A. is non-zero and points in the Z-direaction by symmetry

B. points along the axis of the toroid $(m = m\phi)$

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

D. is pointing radially outwards

Answer: C

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69. A magnet of magnetic moment M is situated with its axis along the direction of a magnetic field of strength B. The work done in rotating it by an angle of 180° will be

A. $-MB$

B. $+MB$

C. zero

D. $+2MB$

Answer: D

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70. A magnet of magnetic moment $2JT^{-1}$ is aligned in the direction of magnetic field of $0.1T$. What is the net work done to bring the magnet normal to the magnrtic field?

A. $0.1J$

B. $0.2J$

C. $1J$

D. $2J$

Answer: B

 Watch Video Solution

71. A planar coil having 15turns carries 20 A currennt . The coil is oriented with respect to the unifrom magnetic field B = 0.5 T such that its direction area is $A = -0.04\hat{i}m^2$. The

potenial energy of the coil in the given orientation is

A. 0

B. $+0.72$

C. 6J

D. $-1.44J$

Answer: C

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72. The magnetic Held of the earth can be modeled by that ofa point dipole placed at the centre of the earth. The dipole axis makes an angle of 11.3° with the axis of the earth. At Mumbai, declination is nearly zero. Then,

A. the declination varies between $11.3^{\circ} W$ to $11.3^{\circ} E$

B. the least declination is 0°

C. the plane defined by dipole axis and the earth axis passes through Greenwhich

D. declination averaged over the earth must be always negative

Answer: A

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73. The magnetic filed on the axis of a short bar magnet at a distance of 10 cm is 0.2 oersted. What will be the field at a point, distant 5 cm on the line perpendicular to the axis and passing through the magnet ?

A. 0.025 oersted

B. 0.2 oersted

C. 0.4 oersted

D. 0.8 oersted

Answer: D

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74. If the angle of dip at two places are 30° and 45° respectively, then the ratio of

horizontal components of earth's magnetic field at the two places will be

A. $\sqrt{3}:\sqrt{2}$

B. $1:\sqrt{2}$

C. $1:\sqrt{3}$

D. $1:2$

Answer: A

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75. The earth's magnetic field at a certain place has a horizontal component 0.3 Gauss and the total strength 0.5 Gauss. The angle of dip is

A. $\tan^{-1}\left(\frac{3}{4}\right)$

B. $\sin^{-1}\left(\frac{3}{4}\right)$

C. $\tan^{-1}\left(\frac{4}{3}\right)$

D. $\sin^{-1}\left(\frac{4}{3}\right)$

Answer: C

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76. At a certain place the angle of dip is 30° and the horizontal component of earth's magnetic field is 0.50 oersted. The earth's total magnetic field is

A. $\sqrt{3}$

B. 1

C. $1/\sqrt{3}$

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

Answer: C

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77. In a permanent magnet at room temperature

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78. A dip needle lies initially in the magnetic merdian when it shows an angle of dip θ at a place. The dip circle is rotated through an angle x in the horizontal plane and then it shows an angle of dip θ'. Then $\frac{\tan\theta'}{\tan\theta}$ is

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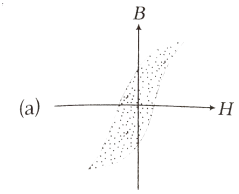
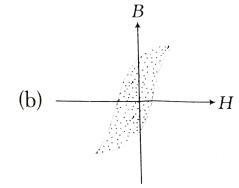
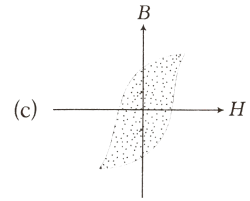
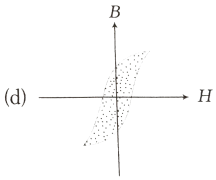
79. For substance hysteresis $(B - H)$ curve are as shown in figure. For making temporary magnet which of the following is the best?

A. 

B. 

C. 

D. 

Answer: D

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80. A bar magnet is oscillating in the earth's magnetic field with a time period T. If the mass is increased four times, then its time period will be:

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81. When 2 amperes current is passed through a tangent galvanometer, it gives a deflection of 30°. For 60° deflection, the current must be

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82. Two tangent galvanometers having coils of the same radius are connected in series. A current flowing in them produces deflections of 60° and 45° respectively. The ratio of the number of turns in the coils is

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83. A bar magnet of length 3cm has points A and B along its axis at distance of $24cm$ and $48cm$ on the opposite sides. Ratio of magnetic field at these points will be

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84. The magnetic moment produced in a substance of $1gmis6 \times 10^{-7}\text{ampere, metre}^2$. If its density is $5gm/cm^3$, then the intensity of magnetisation in A/m will be

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85. A short bar magnet is arranged with its north pole pointing gergraphical north. It is found that the horizontal component of earth's magnetic induction (B_H) is balaced by

the magnetic induction of the magnet at a point which is at a distance of 20 cm from its centre .The magnetic moment of the magnet is $\left(\text{ if } H = 4 \times 10^{-5} Wbm^{-2} \right)$

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86. A long magnetic needle of length 2L, magnetic moment M amd pole strength m units is broken into two pieces at the middle. The magnetic moment amd pole strength of each piece will be

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87. Consider the two idealised systems

(i) a parallel plate capacitor with large plates and small separation and

(ii) a long solenoid of length $L > > R$, radius of cross section.

In (i) $\vec{E}$ is ideally treated as a constant between plates and zero outside. In (ii) magnetic field is constant inside the solenoid and zero outside. These idealised

assumptions, however, contradict fundamental laws as below

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88. Due to a small magnet intensity at a distance x in the end on position is 9 Gauss. What will be the intensity at a distance $\frac{x}{2}$ on broad side on position?

A. 9 gauss

B. 4 gauss

C. 36 gauss

D. 4.5 gauss

Answer: C

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89. A magnet oscillating in a horizontal plane has a time period of 2 seconds at a place where the angle of dip is 30° and 3 seconds at another place where the angle of dip is 60°.

The retio of resultant magnetic field at the two places is

A. $\frac{4\sqrt{3}}{7}$

B. $\frac{4}{9\sqrt{3}}$

C. $\frac{9}{4\sqrt{3}}$

D. $\frac{9}{\sqrt{3}}$

Answer: C

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90. Two short magnets of equal dipole moments M are fastened perpendicularly at their centres (figure). The magnitude of the magnetic field at a distance d from the centre on the bisector of the right angle is

(##HCV_VOL2_C36_E01_006_Q01##)

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

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

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

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

Answer: B

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91. Two bar magnets of the same length and breadth but having magnetic moments M and $2M$ are joined with like poles together and suspended by a string. The time of oscillation of this assembly in a magnetic field of strength B is 3 sec. What will be the period of oscillation, if the polarity of one of the

magnets is changed and the combination is again made to oscillate in the same field ?

A. $\sqrt{3}s$

B. $3\sqrt{3}s$

C. $3s$

D. 6s

Answer: B

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92. The period of oscillation of a suspended thin cylindrical magnet is 4 seconds. It is broken into exactly two halves. Find the period of oscillation of each half when freely suspended.

A. 4s

B. 2s

C. 1s

D. $2\sqrt{2}s$

Answer: B

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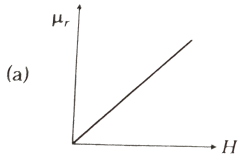
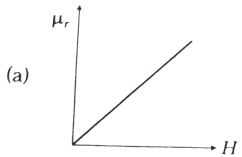
93. For ferromagnetic material, the relative permeability (mu_(r)), versus magnetic intensity (H) has the following shape

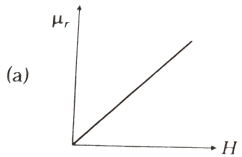
A.

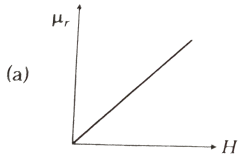


B.



C.



D. 

Answer: D

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94. Two magnets of same size and mass make respectively 10 and 15 oscillations per minute at certain place. The ratio of their magnetic moment is

A. $4:9$

B. $9:4$

C. $2:3$

D. $3:2$

Answer: A

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95. There are four light weight rod samples A,B,C and D separately suspended by thread. A bar magnet is showly brought near each

sample and the following observations are noted

A. C is a diamagnetic material

B. D is of a ferromagnetic material

C. A is of a non-magnetic meterial

D. B is of a paramagnetic material

Answer: D

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96. Two like mangetic poles of strength 10 and 40 SI units are separated by a distance 30cm. The intensity of magnetic field is zero on the line joining them

A. At a point 10cm from the stronger pole

B. At a point 20cm from the stronger pole

C. At the mid point

D. At infinity

Answer: B

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97. A magnet makes 40 oscillations per minute at a place having magnetic field intensity of $0.1 \times 10^{-5} T$. At another place, it takes 2.5 sec to complete one vibrating. The value of earth's horizontal field at that place is

A. $0.25 \times 10^{-6} T$

B. $0.36 \times 10^{6} T$

C. $0.66 \times 10^{-8} T$

D. $1.2 \times 10^{-6} T$

Answer: B

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98. A circuit coil of radius 20 cm and 20 turns of wire is mounted vertically withits plane in the magnetic meridian. A small magnetic needle placed at the center of the coil is deflected through 45° when a current is passed through the coil. What is the value of the current? (horizontal induction of earth's field = $3.6 \times 10^{-5} Wb/m^2$

A. 0.6A

B. 6A

C. $6 \times 10^{-3} A$

D. 0.06A

Answer: A

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99. A dip circle is adjusted so that its needle moves freely in the magnetic meridian. In this position, the angle of dip ia 40°. Now the dip

circle is rotated so that the plane in which the needle moves makes an angle of 30° with the magnetic meridian. In this position the needle will dip by an angle

A. 40°

B. 30°

C. more than 40°

D. less than 40°

Answer: A

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100. An iron rod of $0 \cdot 2cm^2$ cross-sectional area is subjected to a magnetising field of $1200Am^{-1}$. The suscaptibility of iron is 599. Find the permeability and the magnetic flux produced.

A. $0.904Wb$

B. $1.81 \times 10^{-5}Wb$

C. $0.904 \times 10^{-5}Wb$

D. $5.43 \times 10^{-5}Wb$

Answer: B

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101. A paramagnetic sample shows a net magnetisation of $8Am^{-1}$ when placed in an external magnetic field of $0 \cdot 6T$ at a temperature of $4K$. When the same sample is placed in an external magnetic field of $0 \cdot 2T$ at a temperature of $16K$, the magnetisation will be

A. $\frac{32}{3}Am^{-1}$

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

C. $6Am^{-1}$

D. $2.4Am^{-1}$

Answer: B

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102. The plane of dip circle is set in the geographic meridian and the apparent dip is θ_1. It is then set in a vertical plane

perpendicular to the geographic meridian. Now, the apparent dip is θ_2. The angle of declination θ at that place is

A. $\theta = \tan^{-1}(\tan\delta_1 \tan\delta_2)$

B. $\theta = \tan^{-1}(\tan\delta_1 + \tan\delta_2)$

C. $\theta = \tan^{-1}\left(\frac{\tan\delta_1}{\tan\delta_2}\right)$

D. $\theta = \tan^{-1}(\tan\delta_1 - \tan\delta_2)$

Answer: C

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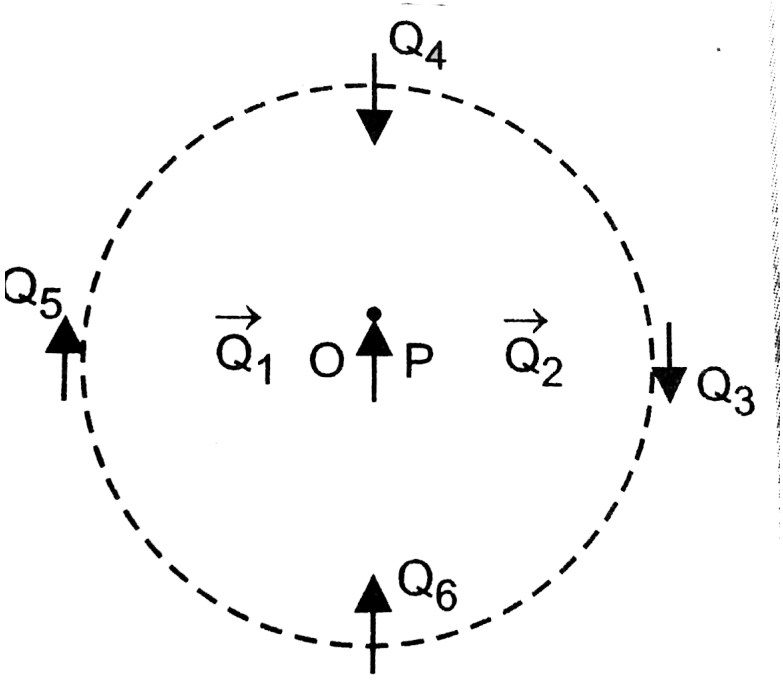
103. Figure shows a small magnetised needle P placed at a point O. The arrow shows the direction of magnetic moment. The other arrows show different positions (and orientations of the magnetic moment) of another identical magnetised needle Q.



(a) In which configuration is the system not in equilibrium?

(b) In which configuration is the system in (i) stable and (ii) unstable equilibrium?

(c) Which configuration corresponds to the lowest potential energy among all the configurations shown?

A. PQ_3

B. PQ_4

C. PQ_5

D. PQ_6

Answer: D

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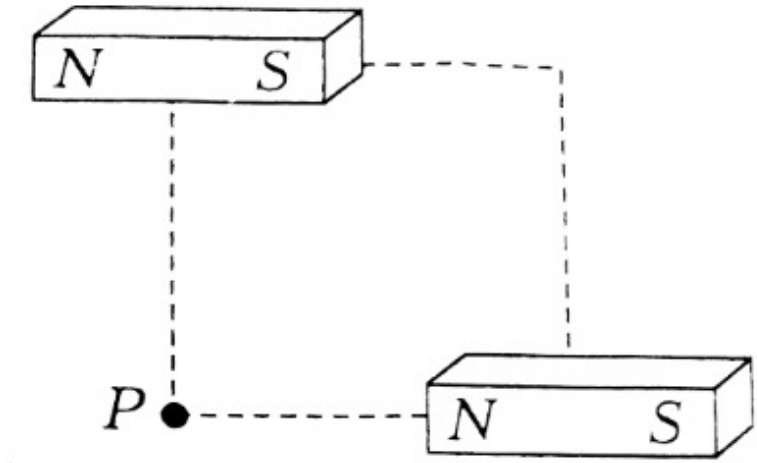
104. Two short magnets of magnetic moment $1000 Am^2$ are placed as shown at the corners of a square of side $10cm$. The net magnetic

induction at P is



A. 0.1T

B. 0.2T

C. 0.3T

D. 0.4T

Answer: A

Watch Video Solution

105. Two magnets are held together in a vibration magnetometer and are allowed to oscillate in the earth's magnetic field with like poles togather, 12 oscillations per minute are made but for unlike poles togather only 4 oscillations per minute are axecuted. The ratio of their magnetic miments is

A. $3:1$

B. $1:3$

C. $3:5$

D. $5:4$

Answer: D

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106. A magnet is suspended in such a way that it oscillates in the horizontal plane. It makes 20 oscillations per minute at a place where dip angle is 30° and 15 oscillations minute at a

place where dip angle is 60°. The ratio of total earth's magnetic field at the two places is

A. $3\sqrt{3}:8$

B. $16:9\sqrt{3}$

C. $4:9$

D. $2\sqrt{2}:3$

Answer: B

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107. Two identical short bar magnets, each having magnetic moment M, are placed a distance of $2d$ apart with axes perpendicular to each other in a horizontal plane. The magnetic induction at a 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. $\left(\frac{2\mu_0}{4\pi}\right)\frac{M}{d^3}$

D. $\frac{\mu_0}{4\pi}(\sqrt{5})\frac{M}{d^3}$

Answer: D

 Watch Video Solution

108. A short magnet oscillation in vibration magnetometer with a frequency 10Hz. A downward current of 15A is established in a long vertical wire placed 20cm to the West of the magnet. The new frequency of the short magnet is (the horizontal of the component os earth's magnetic field is 12μ)

A. 4Hz

B. 2.5Hz

C. 9Hz

D. 15Hz

Answer: D

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109. Two bar magnets having same geometry with magnetic moments M and 2M, are firstly placed in such a way what their similar poles

are same side then its time period of oscillation is T_1. Now the polarity of one of the magnet is reversed then time period of oscillation will be:-

A. $T_1 < T_2$

B. $T_1 > T_2$

C. $T_1 = T_2$

D. $T_1 = \infty, T_1 = 0$

Answer: A

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110. The length of a magnet is large compared to its width and breadth. The time period of its oscillation in a vibration magnetometer is $2s$. The magnet is cut along its length into three equal parts and these parts are then placed on each other with their like poles together . The time period of this combination will be

A. 2s

B. $\frac{2}{3}s$

C. $2\sqrt{3}s$

D. $\frac{2}{\sqrt{3}}s$

Answer: B

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111. Assertion: The poles of magnet cannot be separated by breaking into two pieces.

Reason: The magnetic moment will be reduced to half when a magnet is broken into two equal pieces.

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: B

 Watch Video Solution

112. Assertion (A): It is not necessary that every magnet has one north pole and one south pole.

Reason (R): It is a basic fact that magnetic poles occur in pairs

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: D

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113. Assertion: Basic difference between an electric line and magnetic line of force is that former is discontinuous and the latter is continuous or endless.

Reason: No electric lines of force exist inside a charged body but magnetic lines do exist inside a magnet.

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: B

 Watch Video Solution

114. Assertion (A): The net magnetic flux coming out of a closed surface is always zero.

Reason (R): Unlike poles of equal strength exist together

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: A

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115. Assertion:Horizontal component of eath's magnetic field (H) has been chosen as a magnetic element instead of the vertical component (V).

Reason: Most of our experiments are

performed in horizontal configuration. So, H is more relevant.

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: A

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116. Assertion: At neutral point, a compass needle may point out in any arbitrary direction.

Reason: Magnetic field of earth is balanced by field due to magnets at neutral point.

A. If both Assertain and Reason are true and Reason is the correct explanation of

Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: A

 Watch Video Solution

117. Assertion (A): Steel is attracted by a magnet

Reason (R): Steel is a magnetic substance

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: C

Watch Video Solution

118. Assertion (A): Relative magnetic permeability has no units and no dimmensions

Reason (R): $\mu_r = \mu / \mu_0$, where the symbols have their standard meaning.

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: A

 Watch Video Solution

119. Assertion (A): If one arm of a $U-$ tube containing a diamagnetic solution is placed in between the poles of a strong magnet with the level in line with the field, the level of the solution falls,

Reason (R): Diamagnetic substances do not aligned with the field

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: A

 Watch Video Solution

120. Assertion (A): The earth's magnetic field is due to iron present in its core.

Reason (R): At a high tempeature magnet losses its magnetic property or magnetism.

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: D

121. Assertion (A): Earth's magnetic field inside a closed iron box is less as compared to the outside

Reason (R): The magnetic permeability of iron is low

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: C

 Watch Video Solution

122. Assertion: To protect any instrument from external magnetic field, it is put inside an iron body.

Reason: Iron is a magnetic substance.

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of

Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: B

Watch Video Solution

123. Assertion (A): $\chi - T$ graph for a diamagnetic material is a straight line parallel to $T -$ axis

Reason (R): This is because susceptibility of a

diamagnetic material is not affected by temperature

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: A

 Watch Video Solution

124. Assertion: When radius of circular loop carrying current is doubled, its magnetic moment becomes four times.

Rrason: Magnetic moment depends on area of the loop.

A. If both Assertain and Reason are true and Reason is the correct explanation of

Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: A

 Watch Video Solution

125. Assertion (A): A magnetic suspended freely in an uniform magnetic field experiences no net force, but a torque that tends to align the magnet along the field when it is deflected form equilibrium position

Reason (R): Net force $mB - mB = 0$, but the forces on north and south poles being equal, unlike and parallel make up a couple that tends to align the magnet, along the field.

A. If both Assertain and Reason are true and Reason is the correct explanation of

Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: A

 Watch Video Solution

126. Assertion: Time period of vibration of a pair of magnets in sum position is always smaller than in difference position.

Reason:`T=2pi sqrt(I//MH)', where symbols have their standard meaning.

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of

Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: B

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127. Assertion: The ferromagnetic substance do not obey Curie's law.

Reason: At Curie point a ferromagnetic

substance start behaving as a paramagnetic subsrance.

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: B

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128. Assertion : Soft iron is used as transformer core.

Reason oft iron has narrow hysteresis loop.

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: A

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129. Assertion : The properties of paramagnetic and ferromagnetic substance are not effected by heating.

Reason : As temperature rises, the alignment of molecular magnets gradually decreases.

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of

Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: C

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130. With reference to magnetic dipole, match the tems of Column I with the tems of Column Ii and Choose the correct option from the

codes given below.

Column I		Column II
(A) Dipole moment	(p)	$-M \cdot B$
(B) Equatiorial field for a short dipole	(q)	$M \times B$
(C) Axial field for a short dipole	(r)	$-\mu_0 m / 4\pi r^3$
(D) External field : Torque	(s)	$\mathbf{m}$
(E) External field : Energy	(t)	$\mu_0 2m / 4\pi r^3$

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131. Consider the expression for magnetic potential energy U_m obtained in previous question, match the tems of colum I with the tems of Column II and choose the correct

option from the codes given below.

	Column I		Column II
(A)	Potential energy at $\theta = 90°$	(p)	Minimum
(B)	Potential energy at $\theta = 0°$	(q)	Maximum
(C)	Potential energy at $\theta = 180°$	(r)	Zero

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132. Match the terms of Column I with the tems of Column II and choose the correct option from the codes given below.

	Column I		Column II
(A)	Negative susceptibility	(p)	Ferromagnetic
(B)	Positive and small susceptibility	(q)	Diamagnetic
(C)	Positive and large susceptibility	(r)	Paramagnetic

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133. Match the terms of Column I with the items of Column II and choose the correct option from the codes given below.

	Column I		Column II
(A)	Diamagnetic	(p)	$\mu >> \mu_0, \mu_r >> 1$ and $\chi >> 1$
(B)	Paramagnetic	(q)	$-1 \leq \chi < 0, \leq \mu_r < 1$ and $\mu < \mu_0$
(C)	Ferromagnetic	(r)	$0 < \chi < \varepsilon, 1 < \mu_r, < 1 + \varepsilon$ and $\mu > \mu_0$

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134. Which magnetic have negative susceptibility?

A. paramagnetic material onty

B. ferromagnetic material only

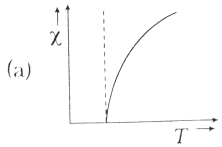
C. paramagnetic and ferromagnetic materials

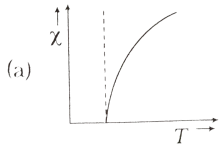
D. diamagnetic materials only

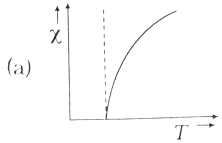
Answer: D

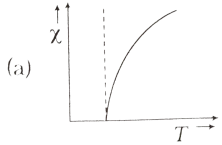
 Watch Video Solution

135. The variation of magnetic susceptibility (x) with absolute temperature T for a paramagnetic material is

A. 

B. 

C. 

D. 

Answer: B

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136. Let r be the distance of a point on the axis of a magnetic dipole from its centre. The magnetic field at such a point is proportional to

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

B. $\frac{1}{r^2}$

C. $\frac{1}{r^3}$

D. none of these

Answer: C

Watch Video Solution

137. Let r be the distance of a point on the axis of a magnetic dipole from its centre. The magnetic field at such a point is proportional to

A. 1/r

B. 1/r2

C. 1/r3

D. NOT

Answer: B

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138. The effective length of magnet is 31.4cm and its pole strength is 0.8Am. The magnetic moment, if it is bent in the form of a semicircle is...$A - m^2$.

A. 1.2

B. 1.6

C. 0.16

D. 0.12

Answer: C

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139. The vertical component of earth's magnetic field at a place is $\sqrt{3}$ times the

horizontal component the value of angle of dip at this place is

A. 60°

B. 30°

C. 45°

D. 0°

Answer: A

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140. A tangent galvanometer has a coil of 50 turns and a radius of 20cm. The horizontal component of the earth's magnetic field is $B_H = 3 \times 10^{-5} T$. Find the current which gives a diflection of 45°).

A. 0.39A

B. 0.29A

C. 0.19A

D. 0.09A

Answer: C

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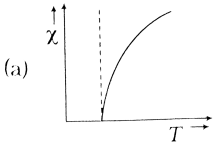
141. The correct between intensity of magnestisation (I) and magnetic field (H) for a ferromagnetic substance is given by

A. 

B. 

C. 

D. 

Answer: B

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142. A bar magnet with magnetic moment $2.5 \times 10^3 JT^{-2}$ is rotating in horizontal plane in the space containing magnetic induction $B = 4 \times 10^5 T$. The work done in rotating the magnet slowly from a direction parallel to the field to a direction 45° from the field, is (in joule).

A. 0

B. 0.2

C. 0.03

D. 0.02

Answer: C

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143. Core of electromagnets are made of ferromagnetic materials which have

A. low permeability and high retentivity

B. high permeability and low retentivity

C. low permeability and low retentivity

D. high permeability and high retentivity

Answer: B

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144. If the magnetising field on a ferromagnetic material is increased, its permeability is

A. decrease

B. increase

C. is unaffected

D. may be increase or decrease

Answer: A

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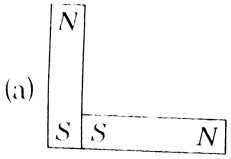
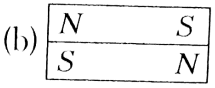
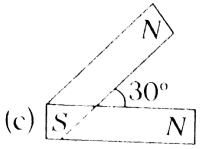
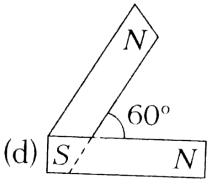
145. Following figures show the arrangement of bar magnets in different configurations. Each magnet has magnetic dipole moment M.

Which configuration has highest net magnetic dipole moment ?

A. 

B. 

C. 

D. 

Answer: C

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146. A bar magnet of moment M and pole strength m is cut into parts of equal lengths. The magetic moment and pole strength of either part is

A. $\frac{M}{2}, \frac{m}{2}$

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

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

D. M,n

Answer: C

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147. 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

148. A paramagnetic sample shows a net magnetisation of $0.8A - m^{-1}$ when plced in an external mgnetic field of 0.8T at a temperature of 5K. Whent the same sample is

placed in an external magnetic field of 0.4T at temperature of 20K, the magnetisation will be

A. $0.8Am^{-1}$

B. $0.8Am^{-2}$

C. $0.1Am^{-1}$

D. $0.1Am^{-2}$

Answer: c

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149. Nickel shows ferromagnetic property at room temperature. If the temperature is increased beyond curie temperature, then it will show

A. paramagnetic

B. anti-ferromagnetism

C. diamagnetism

D. no magnetic property

Answer: A

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150. The intensity of magnetisation of a bar magnet is $5 \times 10^4 A - m^{-1}$. The magnetic length and the area of cross section of the magnet are 12cm and $1cm^{-2}$ respectivley. The magnitude of magnetic moment of this bar magnet (in SI unit) is.

A. 0.6

B. 1.3

C. 1.2

D. 2.4

Answer: A

Watch Video Solution

151. The magnetic susceptibility of a metrial of a rod is 299. Permeatbility of vaccum μ_0

A. $3771 \times 10^{-7} Hm^{-1}$

B. $3771 \times 10^{-5} Hm^{-1}$

C. $3770 \times 10^{-6} Hm^{-1}$

D. $3771 \times 10^{-8} Hm^{-1}$

Answer: A

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152. A wire of length l meter carrying current i ampere is bent in form of circle. Magnetic moment is

A. $\frac{L^2 I^2}{4\pi}$

B. $\frac{LI}{4\pi}$

C. $\frac{L^2 I}{4\pi}$

D. $\frac{LI}{4\pi}$

Answer: C

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153. An electron in a circular orbit of radius 0.05 mm performs $10^{16} \text{rev}/s$. the magnetic moment due to this rotation of electron is $(\in A - m^2)$.

A. 2.16×10^{-23}

B. 3.21×10^{-22}

C. 3.21×10^{-24}

D. 1.26×10^{-23}

Answer: D

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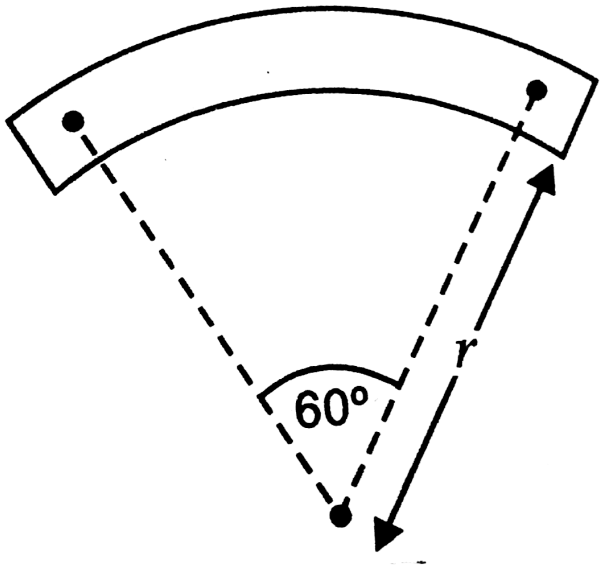
154. A bar magnet of lenth l and magnetic dipole moment 'M' is bent in the form of an arc as shown in figure. The new magnetic

dipole moment will be



A. M

B. $\frac{3}{\pi}M$

C. $\frac{2}{\pi}M$

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

Answer: B

Watch Video Solution

155. The horizontal and vertical components of earth's magnetic field at a place are 0.3G and 0.52G. The earth's magnetic field and the angle of dip are

A. $0.3G$ and $\delta = 30^\circ$

B. $0.4G$ and $\delta = 40^\circ$

C. $0.5G$ and $\delta = 50^\circ$

D. $0.6G$ and $\delta = 60^\circ$

Answer: D

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156. A bar magnet of pole strength 10A-m is cut into two equal parts breathwise. The pole strength of each magnet is

A. 5A-m

B. 10A-m

C. 15A

D. 15A-m

Answer: A

Watch Video Solution

157. A short magnet of magnetic induction fields B_1, B_2, B_3 values on this line at points which are at distance 30cm, 60cm and 90cm respectivley from the centre of the magnet is

A. $27:3:37:1$

B. $37.3:1:27$

C. $27:8:3.37$

D. $1:2:3$

Answer: A

Watch Video Solution

158. A bar magnet of moment of inertia I is vibrated in a magnetic field of inducton is $0.4 \times 10^{-4} T$. The time period period of

vibration is 12 sec. The magnetic moment of the magnet is $120 Am^2$. The moment of inertia of the magnet is ("in"kgm^(2))` approximately

A. 172.8×10^{-4}

B. 2.1×10^{-2}

C. 1.57×10^{2}

D. 1728×10^{-2}

Answer: A

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159. On heating a ferromagnetic substance above curie temperature

A. becomes paramagnetic

B. becomes diamagnetic

C. remains ferromagnetic with constant magnetic susceptibility

D. becomes electromagnetic

Answer: A

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160. The work done in turning a magnet of magnetic moment 'M' by an angle of 90° from the meridian is 'n' times the corresponding work done to turn it through an angle of 60°, where 'n' is given by

A. 1

B. 2

C. $1/2$

D. $1/4$

Answer: B

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161. A dip needle vibrates in the vertical plane perpendicular to the magnetic meridian. The time period of vibration is found to be 2 sec. The same needle is then allowed to vibrate in the horizontal plane and the time period is again found to be 2 seconds. Then the angle of dip is

A. 0°

B. 30°

C. 45°

D. 90°

Answer: C

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162. The dipole moment of a short bar magnet is $1.25A - m^2$. The magnetic field on its axis at a distance of 0.5 metre from the centre of the magnet is

A. $1 \times 10^{-4} NA^{-1}m^{-1}$

B. $2 \times 10^{-6} NA^{-1}m^{-1}$

C. $4 \times 10^{-2} NA^{-1}m^{-1}$

D. $6.64 \times 10^{-8} NA^{-1}m^{-1}$

Answer: B

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163. The horizontal component of the earth's magnetic field at a place is $3 \times 10^{-4} T$ and the

dip is $\tan^{-1}\left(\frac{4}{3}\right)$. A metal rod of length $0.25m$ placed in the north -south position and is moved at a constant speed of $10cm/s$ towards the east. The emf induced in the rod will be

A. $1\mu V$

B. $5\mu V$

C. $7\mu V$

D. $10\mu V$

Answer: D

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164. Assertion: Suceptibility is defined as the ration of intensity of magnetisation I to magnetic intensituy H.

Reason: Greater the value of susceptibility smaller the value of intensity of magnetisation I.

A. If both Assertain and Reason are true and Reason is the correct explanation of Assertain

B. If both Assertain and Reason are true but Reason is not correct explantion of Assertain

C. If Assertion is true but Reason is false

D. If Assertion is false but Reason in true.

Answer: C

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165. The real angle of dip, if a magnet is suspended at an angle of 30° to the magnetic meridian and the dip needle makes an angle of 45° with horizontal, is:

A. $\tan^{-1}\left(3/\sqrt{2}\right)$

B. $\tan^{-1}\left(\sqrt{3}\right)$

C. $\tan^{-1}\left(3/\sqrt{2}\right)$

D. $\tan^{-1}\left(2/\sqrt{3}\right)$

Answer: D

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166. If a steel wire of length l and magnetic moment M is bent into a semicircular are, the the new magnetic moment is

A. $M \times l$

B. $\frac{M}{l}$

C. $\frac{2M}{\pi}$

D. M

Answer: C

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167. An iron rod of volume $10^{-4}m^3$ and relative permeability 1000 is placed inside a long solenoid wound with $5\text{turns}/\text{cm}$. If a current of $0.5A$ is passed through the solenoid, then the magnetic moment of the rod is

A. $20Am^2$

B. $25Am^2$

C. $30Am^2$

D. $35Am^2$

Answer: B

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168. Two tangent galvanometers A and B have coils of radii $8cm$ and $16cm$ respectively and resistance $8ohm$ each. They are connected in parallel to a cell of emf $4V$ and negligible internal resistance. The deflections produced

are 30° and 60° respectivley. A has 2 turns. What is the number of turns in B?

A. 18 turns

B. 12 turns

C. 6 turns

D. 2 turns

Answer: B

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