PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MAGNETISM-I

Example

1. The length of a magnetised steel wire is l is the magnetic momemt is M. It is bent the

shape of L with two sides equal. What will be the new magnetic moment?

A. 2M

B. $M/2$

C. $\sqrt{2}M$

D. $M/\sqrt{2}$

Answer: D

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2. 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.

A. 45°

B. 41°

C. 31°

D. 60°

Answer: B

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3. A planar loop of irregular shape encloses an area of $7 \cdot 5 \times 10^{-4} m^2$, and carries a current of $12A$. The sense of flow of current appears to be clockwise to an observer. What is the magnitude and direction of the magnetic moment vector associated with the current loop?

A. $9 \times 10^{-3} A - m^2$

B. $4.5 \times 10^{-4} A - m^2$

C. $1.8 \times 10^{-4} A - m^2$

D. $9 \times 10^{-4} A - m^2$

Answer: A

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4. 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.

A. $8.3 \times 10^{-23} A - m^2$

B. $9.3 \times 10^{-24} A - m^2$

C. $7.2 \times 10^{-24} A - m^2$

D. $6 \times 10^{-24} A - m^2$

Answer: B

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5. The space inside a toroid is filled with tungsten whose susceptibility is 6.8×10^{-5} .

The percentage increase in the magnetic field will be

A. $0.0068\ \%$

B. $0.068\ \%$

C. $0.68\ \%$

D. None of these

Answer: A

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6. Relative permeability of iron is 4000. What is its magnetic susceptibility ?

A. 4001

B. 3999

C. 4000×10^{-2}

D. 4000×10^{2}

Answer: B

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7. 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. $7.9 \times 10^5 TmA^{-1}$

B. $8.0 \times 10^{22} TmA^{-1}$

C. $7.5 \times 10^{-4} TmA^{-1}$

D. $7.8 \times 10^{-5} TmA^{-1}$

Answer: C

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8. A solenoid of 600 turns per metre is carrying a current of 4 A . Its core is made of iron with relative permeability of 5000. Calculate the intensity of magnetisation and magnetic field inside the core .

A. $1.2 \times 10^7 Am^{-1}$ and $15T$

B. $2.3 \times 10^9 Am^{-1}$ and $13T$

C. $2.7 \times 10^{11} Am^{-1}$ and $16T$

D. $1.8 \times 10^6 Am^{-1}$ and $14T$

Answer: A

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9. A domain in ferromagnetic iron is in the form of a cube of side length $10^{-4}m$. Estimate the number of iron atoms in the domain and the maximum possible dipole moment and magnetisation of the domain. The molecular mass of iron is $55g/\text{mole}$, and its density is $7 \cdot 9g/cm^3$. Assume that each iron atom has a dipole moment of $9 \cdot 27 \times 10^{-24}Am^2$.

A. $8 \times 10^5 A - m^{-2}$

B. $4 \times 10^5 A - m^{-1}$

C. $8 \times 10^{-13} A - m^2$

D. $8 \times 10^{13} A - m^2$

Answer: C

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10. The susceptibility of a magnetism at 300 K is 1.4×10^{-5}. The material is heated and at a particular temperature is susceptibility

increased to 2.1×10^{-5} . What is the change in temperature of the material ?

A. 200K

B. 300K

C. 400K

D. 100K

Answer: D

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Exercise 1

1. Magnetic length is

A. less than geometric length

B. equal to geometric length

C. greater than geometric length

D. None of the above

Answer: A

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

A. a point always has a single net magnetic field

B. the lines have similar charges and so repel each other

C. the lines always diverge from a single point

D. None of the above

Answer: D

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

A. 

B. 

C. 

D. 

Answer: D

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4. SI unit of magnetic pole strength is

A. A-m

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

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

D. $A - m^{2}$

Answer: A

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

B. 1

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

D. $\sqrt{2}$

Answer: D

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

A. $4\pi A - m^2$

B. $8\pi A - m^2$

C. $4A - m^2$

D. None of these

Answer: D

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7. Following figures show the arrangement of bar magnets in different configuration . 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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8. At a point on the right bisector of a magnetic dipole the magnetic potential

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: B

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

A. $1:1$

B. $2:3$

C. $2:1$

D. $3:2$

Answer: C

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10. 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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11. 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 both magnets is

A. 3B

B. $\sqrt{5}B$

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

D. B

Answer: B

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12. 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. $-B \cdot M$

C. $M \cdot B$

D. $M + B$

Answer: A

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13. 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 anlge of 30° is

A. 1.5×10^{-5}N-m

B. 1.5×10^{-3}N-m

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

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

Answer: A

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14. A bar magnet is held at right angle to a uniform magneitc field. The couple acting on the acting on the magnet is to be halved by

rotating it form this position. The angle of rotation is

A. 60°

B. 45°

C. 30°

D. 75°

Answer: A

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15. 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 present but not torque

Answer: B

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16. With reference to magnetic dipole , match the terms of Column I with the terms of Column II and choose the correct option from the codes given below

Mark the correct option from the codes given below

A. $\begin{matrix} A & B & C & D \\ p & q & s & t \end{matrix}$

B. $\begin{matrix} A & B & C & D \\ s & r & t & q \end{matrix}$

C. $\begin{matrix} A & B & C & D \\ p & r & q & s \end{matrix}$

D.
$$\begin{matrix} A & B & C & D \\ r & s & q & p \end{matrix}$$

Answer: B

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17. 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

A. $0.23JT^{-1}$

B. $0.40JT^{-1}$

C. $0.80JT^{-1}$

D. zero

Answer: B

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18. The earth's magnetic field is approximately

A. $10^{-4}T$

B. $10^{-5}T$

C. $10^{-6}T$

D. None of the above

Answer: A

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19. Magnetic meridian is an imaginary:

A. point

B. horizontal plane

C. vertical plane

D. line along N-S

Answer: C

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20. The angle between the magnetic meridian and geographical meridian is called

A. angle of dip

B. angle of declination

C. magnetic moment

D. power of magnetic field

Answer: B

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

A. isobaric lines

B. isogonic lines

C. isoclinic lines

D. isodynamic lines

Answer: C

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22. Aclinic 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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23. The angle which are total magnetic field of earth makes with the surface of the earth is called

A. declination

B. magnetic meridian

C. geographic meridian

D. inclination

Answer: D

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24. The angle of dip at the magnetic equator is

A. 0°

B. 30°

C. 60°

D. 90°

Answer: A

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

A. magnetic equator

B. magnetic pole

C. geographical north pole

D. everywhere

Answer: B

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26. 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: A

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27. 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: A

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

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

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

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

Answer: D

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29. 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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30. 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. $\tan\delta\text{cosec}\theta$

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

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

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

Answer: A

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31. At a neutral point

A. field of magnet is zero

B. field of earth is zero

C. field of magnet is perpendicular to field to earth

D. None of the above

Answer: D

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32. 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

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33. When the N-pole of a bar magnet points towards the south and S-pole towards the north, the null points are at the

A. magnetic axis

B. magnetic centre

C. perpendicular divider of magnetic axis

D. N and S-poles

Answer: A

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34. The magnetic field of Earth can be modelled by that of a point dipole placed at the centre of the Earth. The dipole axis makes

an angle of $11 \cdot 3^{\circ}$ with the axis of Earth. At Mumbai, declination is nearly zero. Then,

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

B. the least declination is 0°

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

D. declination averaged over the earth must be always negative

Answer: A

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

A. 8.3×10^{6}

B. 3.0

C. 1.2×10^{-7}

D. 3×10^{-6}

Answer: B

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36. Which of the following expression represents the relation between orbital

magnetic moment and orbital angular momentum of an electron?

A. $\mu_{\text{orb}} = -\frac{2m_e}{e}L_{\text{orb}}$

B. $\mu_{\text{orb}} = -2m_eL_{\text{orb}}$

C. $\mu_{\text{orb}} = -\frac{3}{2m_e}L_{\text{orb}}$

D. $\mu_{\text{orb}} = \frac{e}{2m_3}L_{\text{orb}}$

Answer: C

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37. 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: A

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38. The magnetic moment of a current (i) carrying circular coil of radius (r) and number of turns (n) varies as

A. $1/r^2$

B. $1/r$

C. r

D. r^2

Answer: D

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39. 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?

A. $6 JT^{-1}$

B. $0.9 JT^{-1}$

C. JT^{-1}

D. $0.6JT^{-1}$

Answer: D

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40. The elementary magnetic moment of revolving electron is also known as

A. Rutherford Magneton

B. Bohr Magneton

C. Planck's Magneton

D. earth's Magneton

Answer: B

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41. The correct value of Bohr magneton is

A. $9.27 \times 10^{-27} Am^2$

B. $9.27 \times 10^{-23} Am^2$

C. $2.97 \times 10^{-24} Am^2$

D. $2.92 \times 10^{-27} Am^2$

Answer: B

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42. 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.

A. $\frac{lL^2}{4\pi} Am^2$

B. $\frac{l^2 L}{4\pi} Am^2$

C. $\frac{lL^2}{2\pi} Am^2$

D. $\frac{l^2 L}{2\pi} Am^2$

Answer: A

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43. 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.

A. $8.27 \times 10^{-26} Am^2$

B. $9.27 \times 10^{-27} Am^2$

C. $9.3 \times 10^{-26} Am^2$

D. $8.8 \times 10^{-27} Am^2$

Answer: C

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44. 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

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45. If the magnetic susceptibility of a material is large and positive. The material is

A. Diamagnetic

B. ferromagnetic

C. paramagnetic

D. perfect diamagnetic

Answer: B

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

A. from stronger to the weaker part of the magnetic field

B. from weaker to the strogner part of the magnetic field

C. perpendicular to the magnetic field

D. in the direction making 60° to the magnetic field

Answer: A

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47. There are four light-weight-rod sample A, B, C, D separately suspended by threads. A bar magnet is slowly brought near each sample and the following observations are noted

(i) A is feebly repelled

(ii) B is feebly attracted

(iii) C is strongly attracted

(iv) D remains unaffected

Which one of the following is true?

A. C is of a diamagnetic material

B. D is of a ferromagnetic material

C. A is of a non-magnetic material

D. B is of a paramagnetic material

Answer: D

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48. A domain in ferromagnetic iron in the form of cube shaving 5×10^{10} atoms. If the side length of this domain is 1.5μ and each atom has a dipole moment of $8 \times 10^{-24} Am^2$, then magnetisation of domain is

A. $7.2 \times 10^5 Am^{-1}$

B. $7.2 \times 10^3 Am^{-1}$

C. $7.2 \times 10^9 Am^{-1}$

D. $7.2 \times 10^{12} Am^{-1}$

Answer: A

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49. 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. 1.24

D. 2.4

Answer: A

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50. Name the SI unit of intensity of magnetisation.

A. Am^{-1}

B. $A - m^2$

C. $A - m$

D. Wm^{-1}

Answer: A

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51. Domain formation is the necessary feature of

A. ferromagnetism

B. paramagnetism

C. diamagnetism

D. All of these

Answer: A

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52. The material of permanent magnet has

A. high-high

B. low-low

C. low-high

D. high-low

Answer: A

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53. At Curie point, a ferromagnetic material transforms into:

A. non-magnetic

B. diamagnetic

C. paramagnetic

D. strong ferromagnetic

Answer: C

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54. Among the following properties describing diamagnetism identify the property that is wrongly stated

A. Diamagnetic material do not have permanent magnetic moment

B. Diamagnetism is explained in terms of electromagnetic induction

C. Diamagnetic materials have a small positive susceptibility

D. The magnetic moment of individual electrons neutralize each other

Answer: C

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55. Magnetic susceptibility for a paramagnetic and diamagnetic materials is respectively,

A. copper, aluminium , iron

B. aluminium , copper , iron

C. copper , iron , aluminium

D. aluminium , iron , copper

Answer: A

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56. 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. $0.1Am$

D. $0.1Am^{-1}$

Answer: D

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57. The relative permeability of a substance X is slightly less than unity and that of substance Y is slightly more than unity then –

A. X is paramagnetic and Y is ferromagnetic

B. X is diamagnetic and Y is ferromagnetic

C. X and Y both are paramagnetic .

D. X is diamagnetic and Y is paramagnetic

Answer: B

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58. The magnetic moment of atomic neon is

A. zero

B. $\mu B / 2$

C. μB

D. $3\mu B / 2$

Answer: A

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Exercise 2

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

A. some distance away from north pole

B. some distance away from south pole

C. the middle of the magnet

D. the ends of the magnet

Answer: D

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2. Magnetic field is measured by

A. pyrometer

B. hydrometer

C. thermometer

D. fluxmeter

Answer: D

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

A. isoclinic line

B. argonic line

C. isogonic line

D. aclinic line

Answer: D

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4. The material suitable for making electromagnets should have

A. high retentivity and high coercivity

B. low retentivity and low coercivity

C. high retentivity and low coercivity

D. low retentivity and high coercivity

Answer: C

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

A. a force and a torque

B. a force but not a torque

C. a torque but not a force

D. Neither a torque nor a force

Answer: A

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

A. zero

B. 11.5°

C. 23°

D. None of these

Answer: B

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

A. magnetic meridian

B. geometric meridian

C. angle of dip

D. None of the above

Answer: A

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8. A dip needle in a plane perpendicular to magnetic meridian will remain

A. vertical

B. horizontal

C. in any direction

D. at an angle of dip to the horizontal

Answer: A

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

A. 0°

B. 30°

C. 60°

D. 90°

Answer: D

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10. 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 component of earth's magnetic field

D. All the above factors

Answer: C

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11. Two lines of force due to a bar magnet

A. intersect at the neutral point

B. intersect near the poles of the magnet

C. intersect on the equatorial axis of the magnet

D. do not intersect at all

Answer: D

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12. 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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13. 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

A. $\frac{\tau_2}{\tau_1}$

B. $\frac{\tau_1}{\tau_2}$

C. $\frac{\tau_1 + \tau_2}{\tau_1 - \tau_2}$

D. $\frac{\tau_1 - \tau_2}{\tau_1 + \tau_2}$

Answer: B

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14. 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

A. horizontal direction only

B. vertical direction only

C. any direction except vertical and horizontal

D. None of the above

Answer: D

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

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

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

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

D. $H = B_e, \theta = 90^\circ$

Answer: C

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16. Magnetic dip was measured at various places on earth in one of the following countries . It was found to be zero in

A. Pakistan

B. Brazil

C. Scotland

D. Canada

Answer: B

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

A. M

B. M/2

C. M/4

D. 2M

Answer: B

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18. A bar magnet when placed at an angle of 30° to the direction of magnetic field 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

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

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

C. $2A - m$

D. $5A - m$

Answer: A

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19. 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-direction by symmetry

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

C. is zero, otherwise there would be a field falling as $\frac{1}{r^3}$

D. is pointing radially outwards

Answer: C

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20. 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. $\sin^{-1}\left(\frac{3}{5}\right)$

Answer: C

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21. A bar magnet of legth 3cm has point A and B along its axis at distances of 24 cm and 48 cm on the opposite sides. Ratio of magnetic fields at these points will be

A. 8

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

C. 3

D. 4

Answer: A

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

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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23. 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. $\theta = \tan^{-1}\dfrac{\tan\delta_1}{\tan\delta_2}$

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

Answer: C

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24. Two short magnets of magnetic moment 1000 $A - m^2$ are placed as shown at the corners of a square of side 10 cm. The net magnetic induction at P is

A. 0.1T

B. 0.2T

C. 0.3T

D. 0.4T

Answer: A

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25. 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. $\left(\frac{2\mu_0}{\pi}\right)\frac{M}{d^3}$

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

Answer: D

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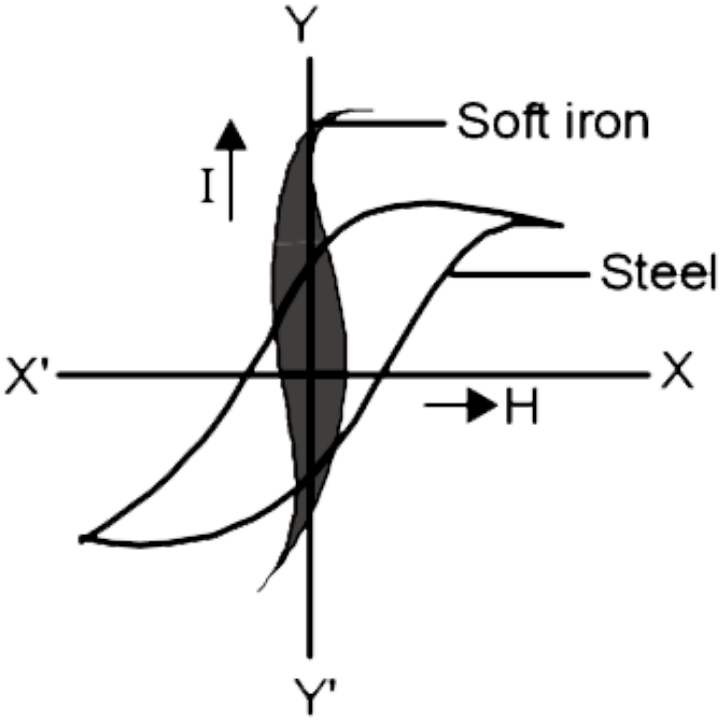
26. The mass of a specimen of a ferromagnetic material is 0.6 kg. and its density is $7.8 \times 10^3 kg/m3$. If the area of hysteresis loop of alternating magnetising field of frequency 50Hz is 0.722 MKS units then the hysteresis

loss per second will be



A. 27.77×10^{-5}J

B. $2.777 \times 10^{-5} J$

C. $27.77 \times 10^{-4} J$

D. $27.77 \times 10^{-6} J$

Answer: C

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27. The magnetic susceptibility of a metrial of a rod is 299. Permeatbility of vaccum μ_0 find the permeatibility?

A. $3777 \times 10^{-7} Hm^{-1}$

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

A. diamagnetism

B. ferrimagnetism

C. paramagnetism

D. ferromagnetism

Answer: C

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29. Curie-Weiss law is obeyed by iron at a temperature....

A. at Curie temeprature only

B. at all temperature

C. below Curie temperature

D. above Curie temperature

Answer: D

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30. Susceptibility of ferromagnetic substance is

A. > 1

B. < 1

C. zero

D. 1

Answer: A

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31. Needles $N_1, N_2,$ and N_3 are made of a 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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32. Ferro magnetic materials used in transformer must have

A. low permeability and high hysterisis loss

B. high permeability and low hysterisis loss

C. high permeability and high hysterisis loss

D. low permeability and low hysterisis loss

Answer: B

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33. A superconducting material is

A. ferromagnetic

B. ferroelectic

C. diamagnetic

D. paramagnetic

Answer: C

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34. The coercitivity 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 $10cm$ and number of turns 100, so that the magnet gets demagnetized when inside the solenoid , is :

A. 30mA

B. 60mA

C. 3A

D. 6A

Answer: C

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

A. Permeability

B. Retentivity

C. Heat energy lost per unit volume in the sample

D. Susceptibility

Answer: C

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36. The susceptibility of magnesium at $300K$ is 1.2×10^{-5}. At what temperature will the susceptibility increase to 1.8×10^{-5}?

A. 150K

B. 200K

C. 250K

D. 20K

Answer: B

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37. Which one of the following characteristics is not associated with a ferromagnetic

A. It is strongly attracted by a magnet

B. It tends to move from a region of low magnetic field to a region of high magnetic field

C. Above the curie temperature , it exhibits paramagnetic properties

D. Its origin is the spin of electrons

Answer: B

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1. The magnetic field (B) inside a long solenoid having n turns per unit length and carrying current / when iron core is kept in it is (μ_o = permeability of vacuum, χ = magnetic susceptibility)

A. $\mu_0 nl(1-x)$

B. $\mu_0 nl\chi$

C. $\mu_0 nl^2(1+\chi)$

D. $\mu_0 nl(1+x)$

Answer: D

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2. An iron rod is placed parallel to magnetic field of intensity $2000Am^{-1}$. The magnetic flux through the rod is 6×10^{-1} Wb and its cross-sectional area is $3cm^2$. The magnetic permeability of the rod in Wb $A^{-1}m^{-1}$ is

A. 10^{-1}

B. 10^{-2}

C. 10^{-3}

D. 10^{-4}

Answer: C

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3. Magnetic susceptibility of a diamagnetic substances

A. small and negative

B. small and positive

C. large and negative

D. large and positive

Answer: A

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4. On applying an external magnetic field , to a ferromagnetic substance domains

A. align in the direction of magnetic field

B. align in the direction opposite to magnetic field

C. remain unaffected

D. None of the above

Answer: A

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5. Nickel shows ferromagnetic property at room temperature. If the temperature is

increased beyond curie temperature, then it will show

A. paramagnetism

B. anti-ferromagnetism

C. no magnetic property

D. diamagnetism

Answer: A

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

A. Paramagnetic

B. ferromagnetic

C. Diamagnetic

D. Anti-ferromagnetic

Answer: C

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7. The magnetism of a bar magnet is due to

A. the earth

B. cosmic rays

C. the spin motion of electrons

D. pressure of big magnet inside the earth

Answer: C

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8. Magnetic permeability is maximum for

A. ferromagnetic substances

B. diamagnetic substance

C. paramagnetic substances

D. All of the above

Answer: A

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