



PHYSICS

BOOKS - DISHA PHYSICS (HINGLISH)

MAGNETISM AND MATTER

Physics

1. A north pole of strength 50 Am and south pole of strength 100 Am are separated by a

distance of 10 cm in air. Find the force between them.

A. $50 \times 10^{-3} N$

B. $25 \times 10^{-3} N$

C. $20 \times 10^{-6} N$

D. $30 \times 10^{-18} N$

Answer:



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2. Calculate magnetic induction at a distance of 20 cm from a pole of strength 40 Am in air.

A. 10^{-4} wb/m^2

B. 10^{-8} wb/m^2

C. 10^{-1} wb/m^2

D. 10^{-12} wb/m^2

Answer:



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3. A bar magnet of length 0.2 m and pole strength 5 Am is kept in a uniform magnetic induction field of strength $15\text{wb}/\text{m}^{-2}$ making an angle of 30° with the field. Find the couple acting on it.

A. 2.5 Nm

B. 5.5 Nm

C. 7.5 Nm

D. 9.0 Nm

Answer:





4. The force experienced by a pole of strength 100 Am at a distance of 0.2 m from a short magnet of length 5 cm and pole strength of 200 Am on its axial line will be

A. $2.5 \times 10^{-2} N$

B. $2.5 \times 10^{-3} N$

C. $5.0 \times 10^{-2} N$

D. $5.0 \times 10^{-3} N$

Answer:



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5. A magnet of moment M is lying in a magnetic field of induction B . W_1 is the work done in turning it from 0° to 60° and W_2 is the work done in turning it from 30° to 90° .

Then

A. $W_2 = W_1$

B. $W_2 = \frac{W_1}{2}$

C. $W_2 = 2W_1$

D. $W_1 = \sqrt{3}W_1$

Answer:



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6. A bar magnet of magnetic moment $2.0 \text{ A} - \text{m}^2$ 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.

A. $10^{-2} J$

B. $10^{-4} J$

C. $10^{-6} J$

D. 0

Answer:



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7. The length of a bar magnet is 10 cm and its pole strength is 10^{-3} Weber. It is placed in a magnetic field of induction $4\pi \times 10^{-3}$ Tesla in a direction making an angle 30° with the field direction. The value of torque acting on the magnet will be –

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

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

C. $0.5 \times 10^2 N - m$

D. None of these

Answer:



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8. At magnetic poles of earth, angle of dip is

A. zero

B. 45°

C. 90°

D. 180°

Answer:



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

A. 2Am^2

B. 1Am^2

C. 0.1Am^2

D. $0.2Am^2$

Answer:



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10. A bar magnet with its poles 25 cm apart and of pole strength $24.0A - m$ rests with its centre on a frictionless pivot. A force F is applied on the magnet at a distance of 12 cm from the pivot, so that it is held in equilibrium

at an angle of 30° with respect to a magnetic field of induction 0.25 T. The value of force F is

A. 65.62 N

B. 2.56 N

C. 6.52 N

D. 6.25 N

Answer:



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11. A small magnet of magnetic moment 4A-m^2 is placed on a deflection magnetometer in tan-B position at a distance of 20cm from the compass needle. At what distance from compass needle should another small magnet of moment 0.5A-m^2 be placed such that the deflection of the needle remains zero ?

A. 12 cm

B. 10 cm

C. 20 cm

D. 30 cm

Answer:



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12. The ratio of intensities of magnetic field, at distances x and $2x$ from the centre of magnet of length 2cm on its axis, will be

A. 4: 1

B. 4: 1 approx

C. 8: 1

D. 8: 1 approx

Answer:



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13. Two magnets A and B are identical and these are arranged as shown in the figure. Their length is negligible in comparison to the separation between them. A magnetic needle is placed between the magnets at point P

which gets deflected through an angle θ under the influence of magnets. The ratio of distance d_1 and d_2 will be



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

B. $(2 \tan \theta)^{-1/3}$

C. $(2 \cot \theta)^{1/3}$

D. $(2 \cot \theta)^{-1/3}$

Answer:



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14. The time period of a freely suspended magnet is 4 seconds. If it is broken in length into two equal parts and one part is suspended in the same way, then its time period will be

A. 4 sec

B. 2 sec

C. 0.5 sec

D. 0.25 sec

Answer:



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15. The length, breadth and mass of two bar magnets are same but their magnetic moments are $3M$ and $2M$ respectively. These are joined pole to pole and are suspended by a string. When oscillated in a magnetic field of strength B , the time period obtained is $5s$. If the poles of either of the magnets are reverse

then the time period of the combination in the same magnetic field will be –

A. $3\sqrt{3}s$

B. $2\sqrt{2}s$

C. $5\sqrt{5}s$

D. $1s$

Answer:



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16. A thin magnetic needle oscillates in a horizontal plane with a period T . It is broken into n equal parts. The time period of each part will be

A. T

B. $\frac{T}{n}$

C. Tn^2

D. $\frac{T}{n^2}$

Answer:



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17. A bar magnet made of steel has a magnetic moment of 2.5 Am^2 and mass of $6.6 \times 10^{-5} \text{ kg}$. If the density of steel is $7.9 \times 10^3 \text{ kgm}^{-3}$, find the intensity of magnetization of the magnet.

A. $3.0 \times 10^6 \text{ A/m}$

B. $2.0 \times 10^6 \text{ A/m}$

C. $5.0 \times 10^6 \text{ A/m}$

D. $1.2 \times 10^6 \text{ A/m}$

Answer:



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18. A short magnet of length 4 cm is kept at a distance of 20 cm to the east of a compass box such that its axis is perpendicular to the magnetic meridian. If the deflection produced is 45° , find the pole strength ($H = 30 \text{ Am}^1$)

A. 17.7 Am

B. 44.2 Am

C. 27.7 Am

D. 37.7 Am

Answer:



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19. A 10 cm long bar magnet of magnetic moment 1.34 Am^2 is placed in the magnetic meridian with its south pole pointing geographical south. The neutral point is obtained at a distance of 15 cm from the

centre of the magnet. Calculate the horizontal component of earth's magnetic field.

A. $0.12 \times 10^{-4} T$

B. $0.21 \times 10^{-4} T$

C. $0.34 \times 10^{-4} T$

D. $0.87 \times 10^{-7} T$

Answer:



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20. A 30 cm long bar magnet is placed in the magnetic meridian with its north pole pointing south. The neutral point is obtained at a distance of 40 cm from the centre of the magnet. Pole strength of the magnet is (The horizontal component of earth's magnetic field is 0.34 Gauss)

A. 26.7 Am

B. 16.7 Am

C. 12.7 Am

D. 15.2 Am

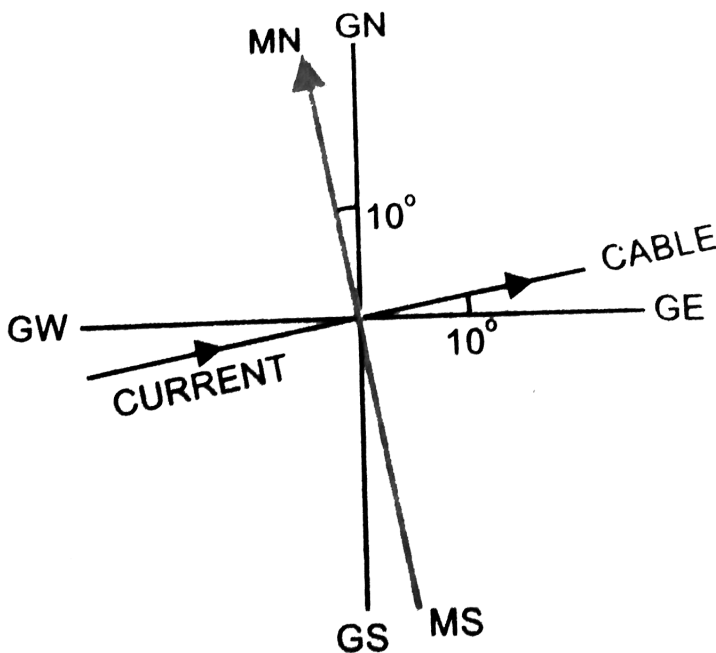
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21. A long straight horizontal cable carries a current of 2.5amp . In the direction 10° south of west to 10° north of east, figure. The magnetic meridian of the place happens to be 10° west of the geographic meridian. The earth's magnetic field at the location is 0.33G

and the angle of dip is zero. Locate the line of neutral points (Ignore the thickness of the cable). [At neutral points, magnetic field due to a current cable is equal and opposite to the horizontal component of earth's magnetic field.]



A. 1.5 cm

B. 2.5 cm

C. 3.5 cm

D. 2.0 cm

Answer:



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22. Which of the following is/are not the main difference between electric lines of force and magnetic lines of force ?

(1) Electric lines of force are closed curves whereas magnetic lines of force are open curves.

(2) Magnetic lines of force cut each other whereas electric lines of force do not cut.

(3) Electric lines of force cut each other whereas magnetic lines of force do not cut.

(4) Electric lines of force are open curves whereas magnetic lines of force are closed curves

A. 1,2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:



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23. The correct statements regarding the lines of force of the magnetic field B are

(1) Magnetic intensity is a measure of lines of force passing through unit area held normal to it

(2) Magnetic lines of force form a closed curve

(3) Due to a magnet magnetic lines of force never cut each other

(4) Inside a magnet, its magnetic lines of force move from north pole of a magnet towards its south pole

A. 1,2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer: A



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24. A short bar magnet of magnetic moment $5 \cdot 25 \times 10^{-2} \text{ JT}^{-1}$ is placed with its axis perpendicular to earth's field direction. At what distance from the centre of the magnet, is the resultant field inclined at 45° with earth's field on (i) its normal bisector, (ii) its axis? Magnitude of earth's field at the place $0 \cdot 42 \text{ G}$. Ignore the length of the magnet in comparison to the distances involved.

A. 1,2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:



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25. A telephonic cable at a place has four long straight horizontal wires carrying a current of 1.0amp. in the same direction east to west.

The earth's magnetic field at the place is $0.39G$ and the angle of dip is 35° . The magnetic declination is almost zero. What are the resultant magnetic fields at points $4.0cm$ below and above the cable?

A. 0.2 Gauss

B. 0.3 Gauss

C. 0.4 Gauss

D. 0.5 Gauss

Answer:



26. A telephonic cable at a place has four long straight horizontal wires carrying a current of 1.0amp. in the same direction east to west. The earth's magnetic field at the place is $0.39G$ and the angle of dip is 35° . The magnetic declination is almost zero. What are the resultant magnetic fields at points 4.0cm below and above the cable?

A. $0.25, 0.56$ Gauss

B. 0.14,0.32 Gauss

C. 0.23,0.34 Gauss

D. 0.52,0.62 Gauss

Answer:



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27. Statement-1 : Gauss theorem is not applicable in magnetism. Statement-2 : Mono magnetic pole does not exist.

A. Statement-1 is True, Statement-2 is True ,
Statement-2 is a correct explanation for
Statement-1

B. Statement-1 is True, Statement-2 is True ,
Statement-2 is NOT a correct explanation
for Statement-1

C. Statement-1 is False, Statement-2 is True

D. Statement-1 is True, Statement-2 is True ,
Statement-2 is a correct explanation for
Statement-1

Answer:



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28. Assertion: A compass needle when placed on the magnetic north pole of the earth rotates in vertical direction.

Reason: The earth has only horizontal component of its magnetic field at the north poles.

A. Statement-1 is True, Statement-2 is True ,
Statement-2 is a correct explanation for
Statement-2

B. Statement-1 is True, Statement-2 is True ,
Statement-2 is NOT a correct explanation
for Statement-2

C. Statement-1 is False, Statement-2 is True

D. Statement-1 is True, Statement-2 is True ,
Statement-2 is a correct explanation for
Statement-2

Answer:



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29. Assertion: We cannot think of magnetic field configuration with three poles.

Reason: A bar magnet does exert a torque on itself due to its own field.

A. Statement-1 is True, Statement-2 is True ,

Statement-2 is a correct explanation for

Statement-3

- B. Statement-1 is True, Statement-2 is True ,
Statement-2 is NOT a correct explanation
for Statement-3
- C. Statement-1 is False, Statement-2 is True
- D. Statement-1 is True, Statement-2 is True ,
Statement-2 is a correct explanation for
Statement-3

Answer:



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30. Susceptibility of ferromagnetic substance is

A. > 1

B. < 1

C. 0

D. 1

Answer:



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31. 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:



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32. If the magnetic dipole moment of an atom of diamagnetic material, paramagnetic material and ferromagnetic material are denoted by μ_d , μ_p and μ_f respectively, then:

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

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

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

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

Answer:



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33. When a piece of a ferromagnetic substance 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

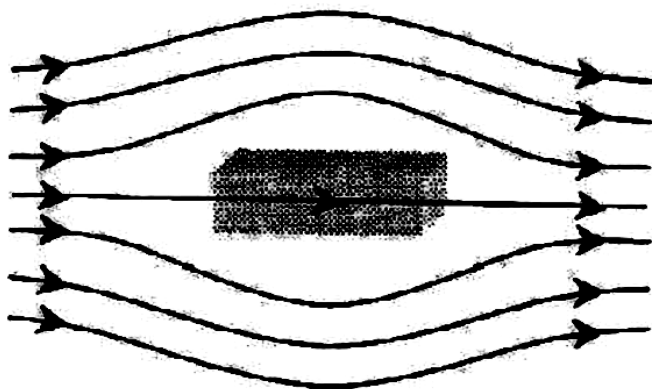
D. 4

Answer:



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34. The given figure represents a material which is



- A. Paramagnetic
- B. Diamagnetic
- C. Ferromagnetic
- D. None of these

Answer:



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

- A. Diamagnetic
- B. Paramagnetic
- C. ferromagnetic
- D. antiferromagnetic

Answer:



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36. A superconductor exhibits perfect

- A. ferrimagnetism
- B. ferromagnetism
- C. paramagnetism
- D. diamagnetism

Answer:



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

- A. Soft iron
- B. Steel
- C. Copper-nickel alloy
- D. Air

Answer:



38. The universal property among all substance is

- A. diamagnetism
- B. ferromagnetism
- C. paramagnetism
- D. all of these

Answer:



39. 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. Antiferromagnetic

Answer:



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40. In the hysteresis cycle, the value of H needed to make the intensity of magnetisation zero is called

- A. Retentivity
- B. Coercive force
- C. Lorentz force
- D. None of these

Answer:





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

A. rise

B. fall

C. oscillate slowly

D. remain as such

Answer:



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

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

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

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

D. $\mu_r > 1, \chi > 0$

Answer:



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43. The use of study of hysteresis curve for a given material is to estimate the

A. voltage loss

B. hysteresis loss

C. current loss

D. all of these

Answer:



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44. The magnetic moment of atomic neon is

A. zero

B. $\mu_B / 2$

C. μ_B

D. $3\mu_B / 2$

Answer:



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45. A ferromagnetic material is heated above its curie temperature. Which one is a correct statement?

A. Ferromagnetic domains are perfectly arranged

B. Ferromagnetic domains becomes random

C. Ferromagnetic domains are not influenced

D. Ferromagnetic material changes itself into diamagnetic material

Answer:



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

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

Answer:



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47. The material of permanent magnet has

- A. high retentivity, low coercivity
- B. low retentivity, high coercivity
- C. low retentivity, low coercivity
- D. high retentivity, high coercivity

Answer:



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48. Diamagnetic substances are

- A. feebly attracted by magnets
- B. strongly attracted by magnets
- C. feebly repelled by magnets
- D. strongly repelled by magnets

Answer:



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49. For an isotropic medium B , μ , H and M are related as (where B , μ_0 , H and M have their usual meaning in the context of magnetic material)

A. $(B - M) = \mu_0 H$

B. $M = \mu_0 (H + M)$

C. $H = \mu_0 (H + M)$

D. $B = \mu_0 (H + M)$

Answer:



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

A. 5500×10^7

B. 5500×10^{-7}

C. 5501

D. 5499

Answer:



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51. A magnetising field of $2 \times 10^3 \text{ amp/m}$ produces a magnetic flux density of 8π Tesla in an iron rod. The relative permeability of the rod will be

A. 10^2

B. 10^0

C. 10^4

D. 10^1

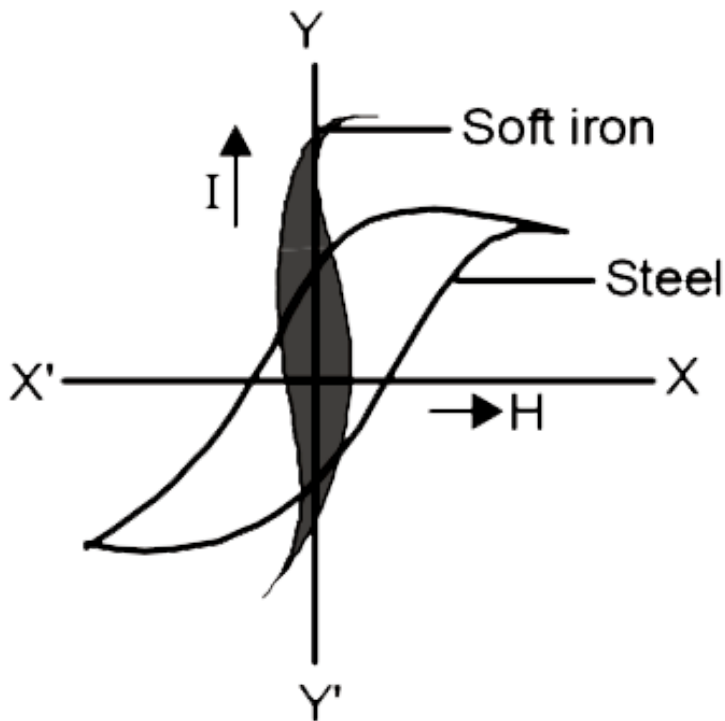
Answer:



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52. The mass of a specimen of a ferromagnetic material is 0.6 kg. and its density is $7.8 \times 10^3 \text{ kg/m}^3$. 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. 277.7×10^{-5} Joule

B. 277.7×10^{-6} Joule

C. 277.7×10^{-4} Joule

D. 27.77×10^{-4} Joule

Answer:



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53. A diamagnetic material in a magnetic field moves

A. from weaker to the stronger parts of the field

B. perpendicular to the field

C. from stronger to the weaker parts of the field

D. None of these

Answer:



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54. A magnetic field of 1600 A m^{-1} produces a magnetic flux of $2 \cdot 4 \times 10^{-5}$ weber in a bar of iron of cross section $0 \cdot 2 \text{ cm}^2$. Calculate permeability and susceptibility of the bar.

A. 1, 2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:



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55. Which of the following statements are false about the magnetic susceptibility χ_m of paramagnetic substance?

Value of χ_m is directly proportional to the absolute temperature of the sample

χ_m is negative at all temperature

χ_m does not depend on the temperature of the sample

χ_m is positive at all temperature

A. 1, 2 and 3 are correct

B. 3 and 2 are correct

C. 4 and 4 are correct

D. 3 and 3 are correct

Answer:



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

Reason: At Curie point a ferromagnetic substance start behaving as a paramagnetic substance.

A. Statement-1 is True, Statement-2 is True,
Statement-2 is a correct explanation for
Statement-1.

- B. Statement-1 is True, Statement-2 is True,
Statement-2 is NOT a correct explanation
for Statement-1.
- C. Statement -1 is False, Statement-2 is
True.
- D. Statement -1 is True, Statement-2 is
False.

Answer:



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57. Assertion: A paramagnetic sample display greater magnetisation (for the same magnetising field) when cooled.

Reason: The magnetisation does not depend on temperature.

A. Statement-1 is True, Statement-2 is True,
Statement-2 is a correct explanation for
Statement-1.

B. Statement-1 is True, Statement-2 is True,
Statement-2 is NOT a correct explanation

for Statement-1.

C. Statement -1 is False, Statement-2 is True.

D. Statement -1 is True, Statement-2 is False.

Answer:



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58. Assertion: The permeability of a ferromagnetic material is independent of the magnetic field.

Reason: Permeability of a material is a constant quantity.

A. Statement-1 is True, Statement-2 is True,
Statement-2 is a correct explanation for
Statement-1.

B. Statement-1 is True, Statement-2 is True,
Statement-2 is NOT a correct explanation

for Statement-1.

C. Statement -1 is False, Statement-2 is True.

D. Statement -1 is True, Statement-2 is False.

Answer:



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