



# PHYSICS

## BOOKS - TARGET PHYSICS (HINGLISH)

### MAGNETISM

#### Classical Thinking

1. A current loop placed in a magnetic field behaves like a

A. magnetic pole

B. magnetic dipole

C. non-magnetic substance

D. bad conductor

**Answer: B**



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2. The magnetic dipole moment of current loop is independent of

- A. current in the coil
- B. number of turns of the coil
- C. strength of the magnetic field
- D. area of the coil

**Answer: C**



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**3. Which of the following represents correct formula for circulating current ?**

$$\text{A. } I = \frac{2\pi r}{v}$$

$$\text{B. } I = \frac{ev}{2\pi r}$$

$$\text{C. } I = \frac{\pi r v}{2e}$$

$$\text{D. } I = \frac{\pi r e v}{2}$$

**Answer: B**



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**4.** If an electron of charge  $(-e)$  and mass  $m_e$  revolves around the nucleus of an atom

having magnetic moment  $M_e$ , then angular momentum of electron is

A.  $L_0 = \frac{M_0 e}{2m_e}$

B.  $L_0 = \frac{e}{2M_0 m_e}$

C.  $L_0 = \frac{2M_0 m_e}{e}$

D.  $L_0 = \frac{2e}{M_0 m_e}$

**Answer: C**



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5. If  $M_0$  and  $L_0$  denote the orbital angular momentum and angular momentum of the electron due to its orbital motion then the gyromagnetic ratio is given by

A.  $\frac{L_0}{M_0}$

B.  $\frac{M_0}{L_0}$

C.  $L_0 M_0$

D.  $\sqrt{\frac{M_0}{L_0}}$

**Answer: B**



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6. The S.I. unit of gyromagnetic ratio is

A. Cm

B. C kg

C.  $C \text{ kg}^{-1}$

D.  $\text{kg C}^{-1}$

**Answer: C**



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7. The magnetic susceptibility is

A.  $\chi = \frac{1}{H}$

B.  $\chi = \frac{B}{H}$

C.  $\chi = \frac{M_{\text{net}}}{V}$

D.  $\chi = \frac{M_z}{H}$

**Answer: D**



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8. Dimensions of magnetization are



A.  $[M^0 L^{-1} T^0 I^1]$

B.  $[M^1 L^1 T^0 I^{-1}]$

C.  $[M^1 L^{-1} T^{-1} I^{-1}]$

D.  $[M^{-1} L^0 T^0 I^{-1}]$

**Answer: A**



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9. Relative permittivity and permeability of a material  $\epsilon_r$  and  $\mu_r$ , respectively . Which of the

following values of these quantities are allowed for a diamagnetic material?

A.  $\epsilon_r = 1.5, \mu_r = 0.5$

B.  $\epsilon_r = 0.5, \mu_r = 0.5$

C.  $\epsilon_r = 1.5, \mu_r = 1.5$

D.  $\epsilon_r = 0.5, \mu_r = 1.5$

**Answer: A**



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10. Magnetization of a sample is

A. volume of sample per unit magnetic moment.

B. net magnetic moment per unit volume.

C. ratio of magnetic moment and pole strength.

D. ratio of pole strength to magnetic moment.

**Answer: B**

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11. According to Curie's law,

A.  $\chi \propto (T - T_c)$

B.  $\chi \propto \frac{1}{T - T_c}$

C.  $\chi \propto \frac{1}{T}$

D.  $\chi \propto T$

**Answer: C**



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12. The cause of paramagnetism is

A. unpaired electrons

B. electron excess and spin motion of electrons

C. paired electrons.

D. orbital motion of electrons

**Answer: B**



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**13.** If a paramagnetic substance is placed in a non-uniform magnetic field, then it will move from

A. weaker to stronger part

B. remains stable

C. stronger to weaker field

D. perpendicular to field

**Answer: A**



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14. 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

A. rise

B. fall

C. remain stationary

D. initially rise and then fall

**Answer: A**



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15. Magnetic susceptibility of a paramagnetic substance is

- A. increases with increase in temperature
- B. decreases with increase in temperature
- C. remains same at any temperature
- D. first increases then decreases with increase in temperature

**Answer: B**





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16. A permanent magnet can be made from which one of the following substances ?

- A. Soft iron
- B. Paramagnetic
- C. Diamagnetic
- D. Ferromagnetic

**Answer: A**



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17. Water is

A. diamagnetic

B. Paramagnetic

C. both a and b

D. None of these

**Answer: A**



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18. Indicate the group containing only diamagnetic substances.

A. Ar, Al, Ag, Ni, Co, Na, Cu

B. Fe, Co, Ni, Gd,  $Fe_3O_4$

C. Al, Mn, Pt, Na,  $O_2$ ,  $CuCl_2$ , Crown glass

D. Air, Mercury, Antimony, NaCl, Au

**Answer: D**



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19. An example of a diamagnetic substance is

A. Aluminium

B. Copper

C. Iron

D. Nickel

**Answer: B**



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20. Permeabilities of diamagnetic materials are

A. zero

B. less than unity

C. equal to unity

D. greater than unity

**Answer: B**



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21. If a diamagnetic liquid is placed in a watch glass on the pole pieces of a magnet, then the liquid will accumulate at

A. centre

B. at some places between end and centre.

C. ends

D. one third of its end

**Answer: C**



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22. When a gas is introduced between the pole-pieces of a magnet, it spreads at right angles to the magnetic field. The gas is

A. paramagnetic

B. ferromagnetic

C. Diamagnetic

D. non-magnetic

**Answer: C**



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**23.** Most of the substances show which of the following types of magnetism ?

A. Paramagnetism

B. Ferromagnetism

C. Diamagnetism

D. Both diamagnetism and ferromagnetism

**Answer: C**



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24. If a substance moves from the stronger to the weaker parts of a non-uniform magnetic field, then it is known as \_\_\_\_\_.

- A. paramagnetic
- B. diamagnetic
- C. ferromagnetic
- D. antiparamagnetic

**Answer: B**



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25. A small piece of unmagnetised substance gets repelled, when it is brought near a powerful magnet. The substance can be \_\_\_\_\_.

A. diamagnetic

B. ferromagnetic

C. non-magnetic

D. paramagnetic

**Answer: A**



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26. Which of the following is ferromagnetic

A. Quartz

B. Bismuth

C. Nickel

D. Aluminium

**Answer: C**



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27. When a ferromagnetic material is placed in a strong external magnetic field, its domain size

A. increases.

B. decreases.

C. remains same.

D. does not depend upon the strength of field.

**Answer: A**



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28. Domain formation is the necessary feature of

A. non magnetics

B. paramagnetics

C. diamagnetics

D. ferromagnetics

**Answer: D**



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29. Magnetic permeability of ferromagnetic substance is

A. always zero

B. minimum

C. maximum

D. less than paramagnetic substance and more than diamagnetic substance.

**Answer: C**



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30. The substances which are strongly attracted by the magnet are

A. diamagnetic

B. paramagnetic

C. ferromagnetic

D. electromagnetic

**Answer: C**



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**31. Iron is ferromagnetic**

A. above  $770^{\circ} C$

B. below  $770^{\circ} C$

C. at all temperature

D. above  $1100^{\circ} C$

**Answer: B**



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**32.** Ferromagnetic ore properties are due to

A. filled inner sub-shells

B. vacant inner sub-shells

C. partially filled inner sub-shells

D. all the sub-shells equally filled

**Answer: C**



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**33.** Ferromagnetic substances have

A. very high permeability and very high susceptibility

B. very high permeability and very low susceptibility

C. very low permeability and very low susceptibility

D. very low permeability and very high susceptibility

**Answer: A**



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**34.** In the unmagnetised state of a ferromagnetic substance, all the domains in it are

- A. parallel to each other
- B. perpendicular to each other
- C. randomly oriented in all directions
- D. anti parallel to each other

**Answer: C**



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**35.** The only property possessed by ferromagnetic substance is

- A. hysteresis
- B. susceptibility
- C. directional property
- D. compressibility

**Answer: A**



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**36.** Susceptibility of ferromagnetic substance  
is

A.  $> 1$

B.  $< 1$

C. 0

D. 1

**Answer: A**



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**37. Assertion :** Paramagnetism and ferromagnetism are associated with orbital motion of electrons.

**Reason :** In ferromagnetics, the magnetic effect is increased due to the formation of domains.

- A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion
- B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion
- C. Assertion is True, Reason is False
- D. Assertion is False but, Reason is True

**Answer: D**



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38. Maximum magnetization of a paramagnetic and ferromagnetic sample

A. is of the same order

B. is smaller for para and larger for ferro

C. is smaller for ferro and larger for para

D. cannot be predicted

**Answer: A**



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**39.** Curie temperature is a particular temperature at which ferromagnetic material changes to

- A. diamagnetic
- B. paramagnetic
- C. non-magnetic
- D. anti-magnetic

**Answer: B**



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**40.** Curie-Weiss law is obeyed by cobalt at a temperature

- A. Below Curie temperature
- B. At Curie temperature only
- C. Above Curie temperature
- D. At all temperatures

**Answer: C**



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41. When a magnetic substance is heated, then it

- A. it becomes a strong magnet
- B. it loses its magnetism
- C. it does not affect the magnetism
- D. its susceptibility increases.

**Answer: B**



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**42.** Assertion : The susceptibility of diamagnetic materials does not depend upon temperature.

Reason : Every atom of a diamagnetic material is not a complete magnet in itself.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False but, Reason is True

**Answer: A**



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**43.** लोहे के अत्यन्त छोटे बन्द बक्से के भीतर पृथ्वी का चुम्बकीय क्षेत्र बाहर की अपेक्षा-

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False but, Reason is True

**Answer: B**



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## Critical Thinking

1. The magnetic induction  $B$  and the force  $F$  on a pole  $m$  are related by

A.  $B = m F$

B.  $F = \frac{m}{B}$

C.  $F = m B$

D.  $F = m^2 B$

**Answer: C**



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2. Magnetic field intensity due to a dipole varies as  $x^n$ , where n is

A. 2

B. -2

C. 3

D. -3

**Answer: D**



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3. The magnetic dipole moment of earth is  $6 \cdot 4 \times 10^{21} Am^2$ . If we consider it to be due to a current loop wound around the magnetic



equator of the earth, then what should be the magnitude of the current? Take earth to be a sphere of radius  $6400\text{km}$ .

A.  $5 \times 10^7 \text{ A}$

B.  $25 \times 10^6 \text{ A}$

C.  $5 \times 10^6 \text{ A}$

D.  $8 \times 10^7 \text{ A}$

**Answer: A**



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4. A current of 10 A is flowing through a circular coil of 5 turns, each of radius 7 cm. The coil lies in the X-Y plane. What is the magnitude and direction of the magnetic dipole moment associated with it ?

A.  $0.47Am^2$  along Z axis

B.  $0.77Am^2$  along Z axis

C.  $0.77Am^2$  along Y axis

D.  $1.54Am^2$  along X axis

**Answer: B**



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5. A steel wire of length 'l' has a magnetic moment 'M'. It is bent in 'L' shape having equal size of arm. The new magnetic moment is

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

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

C. M

D. 2M

**Answer: B**



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6. The electron in the hydrogen atom is moving with a speed of  $2.5 \times 10^6$  m/s in an orbit of radius  $0.5 \text{ \AA}$ . Magnetic moment of the revolving electron is

A.  $10^{-20} \text{ Am}^2$

B.  $2 \times 10^{-21} \text{ Am}^2$

C.  $10^{-23} \text{ Am}^2$

D.  $3 \times 10^{-19} \text{ Am}^2$

**Answer: C**



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7. An electron in an atom revolves around the nucleus in an orbit of radius  $0.5 \text{ \AA}$ . Calculate the equivalent magnetic moment if the frequency of revolution of electron is  $10^{10} \text{ MHz}$

A.  $0.8 \times 10^{-23} \text{ Am}^2$

B.  $1.1 \times 10^{-22} \text{ Am}^2$

C.  $1.256 \times 10^{-23} Am^2$

D.  $1.256 \times 10^{-28} Am^2$

**Answer: C**



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**8.** A charge  $q$  is circulating with a constant speed  $v$  in a semicircular loop of wire of radius  $R$ . The magnetic moment of this loop is

A.  $qvR$

B.  $\frac{\pi Rqv}{2(\pi + 2)}$

C.  $\frac{qvR}{3}$

D.  $\frac{qv\pi R}{\pi + 2}$

**Answer: B**



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9. For an isotropic medium  $B$ ,  $\mu$ ,  $H$  and  $M$  are related as (where  $B$ ,  $\mu_0$ ,  $H$  and  $M$  have their usual meaning in the context of magnetic material)

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

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

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

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

**Answer: D**



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**10.** Relative permeability of nickel is 600, then its magnetic susceptibility will be



A.  $600 \times 10^7$

B.  $600 \times 10^{-7}$

C. 601

D. 599

**Answer: D**



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**11.** The maximum value of permeability of Mu-metal is  $0.126 \frac{T - m}{A}$ . Find maximum relative permeability and susceptibility .

A.  $10^4$

B.  $10^5$

C.  $2 \times 10^6$

D.  $3 \times 10^5$

**Answer: B**



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**12.** What is the magnetization of a bar magnet having length 6 cm and area of cross section  $5 \text{ cm}^2$  ? ( $M = 1 \text{ Am}^2$ )

A.  $1.2 \times 10^{-4} A/m$

B.  $3.3 \times 10^4 A/m$

C.  $1.25 \times 10^{-4} A/m$

D.  $3.3 \times 10^{-4} A/m$

**Answer: B**



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**13.** The space inside a toroid is filled with tungsten whose susceptibility is  $6.8 \times 10^{-5}$ .

The percentage increase in the magnetic field will be

A.  $6.8 \times 10^{-3}$

B.  $68 \times 10^{-3}$

C.  $6.08 \times 10^{-4}$

D.  $68 \times 10^5$

**Answer: A**



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14. A magnet of magnetic moment  $3 \text{ Am}^2$  weighs 75 g. The density of the material of the magnet is  $7500 \text{ kg/m}^3$ . What is the magnetization ?

A.  $4 \times 10^5 \text{ A/m}$

B.  $3 \times 10^5 \text{ A/m}$

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

D.  $2.5 \times 10^5 \text{ A/m}$

**Answer: B**



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15. The susceptibility of a magnetic material is  $\chi$  at  $127^\circ C$ . At what temperature , its susceptibility will be reduced to half of its original value ?

A.  $327^\circ C$

B.  $427^\circ C$

C.  $527^\circ C$

D.  $627^\circ C$

**Answer: C**



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**16.** The susceptibility of a paramagnetic substance was found for different temperatures and a graph of  $\chi$  against  $\frac{1}{T}$  was plotted. From the graph, it was found that when  $\chi = 0.5$ ,  $\frac{1}{T} = 5 \times 10^{-3} / K$ . What is the curie constant for the substance ?

A. 50 K

B. 75 K

C. 100 K

D. 125 K

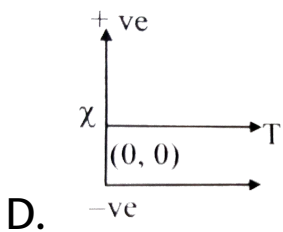
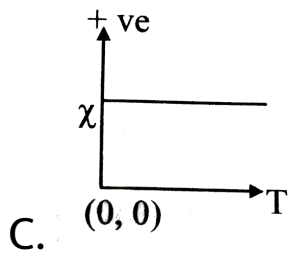
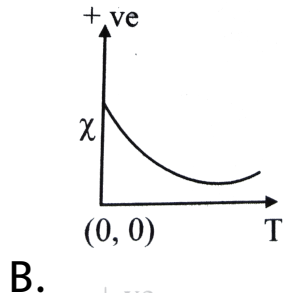
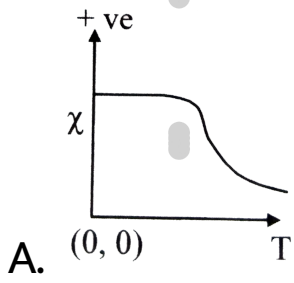
**Answer: C**



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**17.** The variation of magnetic susceptibility ( $\chi$ ) with absolute temperature  $T$  for a ferromagnetic material is



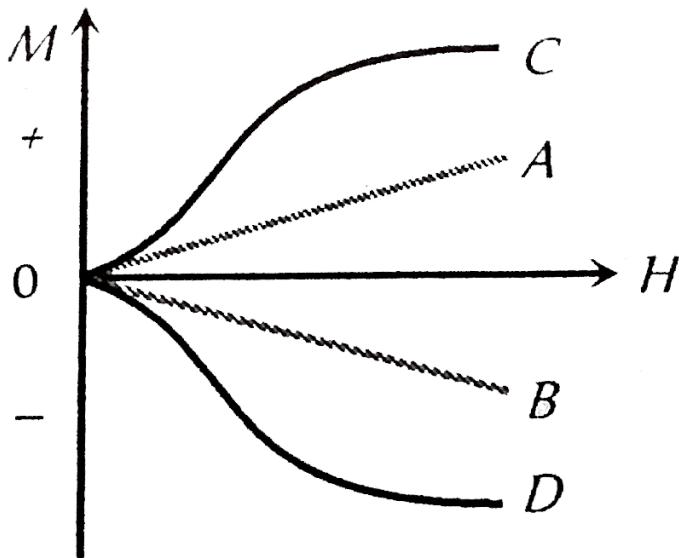


**Answer: A**



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18. The most appropriate magnetization  $M$  versus magnetising field  $H$  curve for a paramagnetic substance is



A. A

B. B

C. C

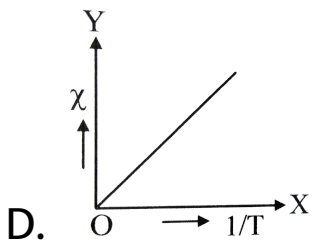
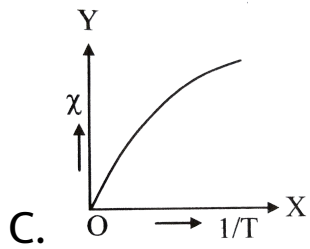
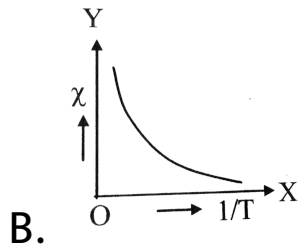
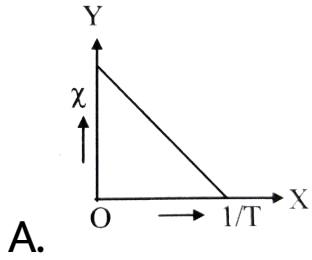
D. D

**Answer: A**



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**19.** The graph between  $\chi$  and  $1/T$  for paramagnetic material will be represented by

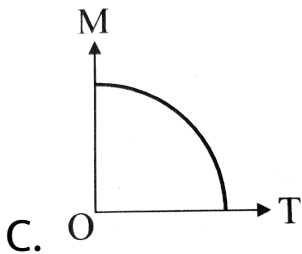
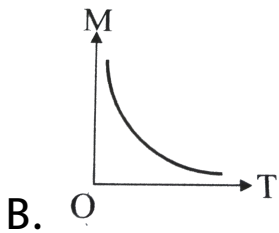
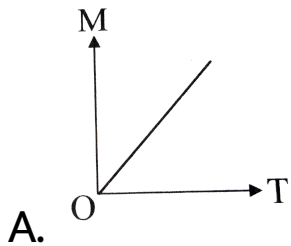


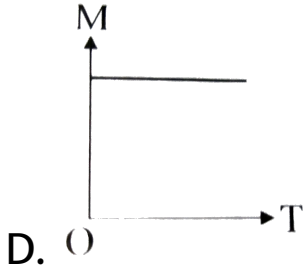
**Answer: D**



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20. A curve between saturation magnetization and temperature of a ferromagnetic sample is





**Answer: C**



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21. A domain in a ferromagnetic substance is in the form of a cube of side length  $1 \mu\text{m}$ . If it contains  $8 \times 10^{10}$  atoms and each atomic dipole has a dipole moment of  $9 \times 10^{-24} \text{ Am}^2$ , then magnetization of the domain is

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

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

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

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

**Answer: A**



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**22.** A solenoid has core of a material with relative permeability 500 and its windings carry a current of 1 A. The number of turns of

the solenoid is 500 per meter. The magnetization of the material is nearly

A.  $2.5 \times 10^3 \text{ Am}^{-1}$

B.  $2.5 \times 10^5 \text{ Am}^{-1}$

C.  $2.0 \times 10^3 \text{ Am}^{-1}$

D.  $2.0 \times 10^5 \text{ Am}^{-1}$

**Answer: B**



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23. The basic magnetization curve for a ferromagnetic material is shown in figure. Then, the value of relative permeability is highest for the point



A. P

B. Q

C. R

D. S

**Answer: B**



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24. Two identical pieces of metal wires are used to make a circular loop and a square loop same current is passed through both the loops what is the ratio of magnetic dipole moment associated with the circular loop that of the square loop ?

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

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

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

D.  $4\pi$

**Answer: C**



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## Competitive Thinking

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

A.  $\frac{IL}{4\pi}$

B.  $\frac{4\pi}{IL^2}$

C.  $4\pi IL^2$

D.  $\frac{IL^2}{4\pi}$

**Answer: D**



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2. A coil carrying current  $I$  has radius  $r$  and number of turns  $n$  it is rewound so that radius of new coil is  $\frac{r}{4}$  and it carries current  $I$  the

ratio of magnetic moment of new coil to that of original coil is

A. 1

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

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

D.  $\frac{1}{8}$

**Answer: C**



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3. A circular coil of radius  $10\text{cm}$  and  $100$  turns carries a current  $1\text{A}$ . What is the magnetic moment of the coil?

A.  $3.142 \times 10^4 \text{Am}^2$

B.  $10^4 \text{Am}^2$

C.  $3.142 \text{Am}^2$

D.  $3 \text{Am}^2$

**Answer: C**



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4. A bar magnet of length  $10\text{cm}$  and having the pole strength equal to  $10^{-3}$  weber is kept in a magnetic field having magnetic induction (B) equal to  $4\pi \times 10^{-3}$  Tesla. It makes an angle of  $30^\circ$  with the direction of magnetic induction. The value of the torque acting on the magnet is

$$(\mu_0 = 4\pi \times 10^{-7} \text{ weber} / \text{amp} \times \text{m})$$

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

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

C.  $0.5 \text{ N} \times \text{m}$

D.  $0.5 \times 10^2 N \times m$

**Answer: A**



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5. A bar magnet is held perpendicular to a uniform magnetic field. If the couple acting on the magnet is to be halved by rotating it, then the angle by which it is to be rotated is

A.  $30^\circ$



B.  $45^\circ$

C.  $60^\circ$

D.  $90^\circ$

**Answer: C**



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6. The ratio (in SI units) of magnetic dipole moment to that of the angular momentum of an electron of mass  $m$  kg and charge  $e$  coulomb in Bohr's orbit of hydrogen atom is

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

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

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

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

**Answer: D**



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7. The magnetic moment of electron due to orbital motion is proportional to  
( $n$ = principle quantum numbers)

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

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

C.  $n^2$

D.  $n$

**Answer: D**



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**8.** A particle of charge  $q$  and mass  $m$  moves in a circular orbit of radius  $r$  with angular speed  $\omega$ . The ratio of the magnitude of its magnetic

moment to that of its angular momentum  
depends on

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

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

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

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

**Answer: A**



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

A.  $1 \times 10^{-29} kg$

B.  $0.1 \times 10^{-29} kg$

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

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

**Answer: D**



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10. If the angular momentum of an electron is  $\vec{J}$  then the magnitude of the magnetic moment will be

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

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

C.  $eJ 2m$

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

**Answer: B**



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11. If  $M_z$  = magnetisation of paramagnetic sample  $B$  = external magnetic field  $T$  = absolute temperature,  $C$  = curie constant then according to Curie's law in magnetism, the correct relation is

A.  $M_z = \frac{T}{CB}$

B.  $M_z = \frac{CB}{T}$

C.  $C = \frac{M_z B}{T}$

$$D. C = \frac{T^2}{M_Z B}$$

**Answer: B**



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12. A bar magnet has length 3 cm, cross-sectional area  $2\text{cm}^3$  and magnetic moment  $3\text{Am}^2$ . The intensity of magnetisation of bar magnet is

A.  $2 \times 10^5 \text{ A/m}$



B.  $3 \times 10^5$  A/m

C.  $4 \times 10^5$  A/m

D.  $5 \times 10^5$  A/m

**Answer: D**



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**13.** Magnetic susceptibility of a paramagnetic substance is

A. positive, but very high

B. negative

C. negative and very high

D. positive, but small

**Answer: D**



**Watch Video Solution**

**14.** The magnetic field ( $B$ ) inside a long solenoid having  $n$  turns per unit length and carrying current  $i$  when iron core is kept in it

is ( $\mu_0$  = permeability of vacuum,  $\chi$  = magnetic susceptibility)

A.  $\mu_0 n I (1 - \chi)$

B.  $\mu_0 n I \chi$

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

D.  $\mu_0 n I (1 + \chi)$

**Answer: D**



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

A.  $5500 \times 10^7$

B.  $5500 \times 10^{-7}$

C. 5501

D. 5499

**Answer: D**



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16. A bar magnet has coercivity  $4 \times 10^3 \text{ Am}^{-1}$ .

It is desired to demagnetise it by inserting it inside a solenoid  $12\text{cm}$  long and having 60 turns. The current that should be sent through the solenoid is

A. 2A

B. 4A

C. 6A

D. 8A

**Answer: D**





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

A.  $10^{-1}$

B.  $10^{-2}$

C.  $10^{-3}$

D.  $10^{-4}$

**Answer: C**



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**18.** A magnetizing field of  $5000 \text{ A/m}$  produces a magnetic flux of  $5 \times 10^{-5} \text{ Wb}$  in an iron rod of  $0.5 \text{ cm}^2$  area of cross-section. The permeability of the rod is (in  $\text{Wb A}^{-1}\text{m}^{-1}$ )

A.  $4 \times 10^{-6}$

B.  $3 \times 10^{-5}$

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

D.  $1 \times 10^{-3}$

**Answer: C**



**Watch Video Solution**

**19.** The magnetic moment of atomic neon is

A. zero

B.  $2\mu_B$

C.  $\mu_B$

D.  $\frac{3\mu_B}{2}$



**Answer: A**



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**20.** The magnetic susceptibility is negative for

A. Ferrromagnetic material only

B. Paramagnetic and ferromagnetic materials

C. Diamagnetic material only

D. Paramagnetic material only

**Answer: C**



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

- A. Value of  $\chi_m$  is directly proportional to the absolute temperature of the sample
- B.  $\chi_m$  is positive at all temperatures.
- C.  $\chi_m$  is negative at all temperatures.

D.  $\chi_m$  does not depend on the temperature of the sample

**Answer: B**



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

A. small, positive and small, positive

B. large, positive and small, negative

C. small, positive and small, negative

D. large, negative and large, positive

**Answer: C**



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**23.**  $\chi_1$  and  $\chi_2$  are susceptibilities of diamagnetic substance at temperatures  $T_1K$  and  $T_2K$  respectively. Then

A.  $\chi_1 = \chi_2$

B.  $\chi_1 T_1 = \chi_2 T_2$

C.  $\chi_1 T_2 = \chi_2 T_1$

D.  $\chi_1 \sqrt{T_1} = \chi_2 \sqrt{T_2}$

**Answer: B**



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**24.** Magnets cannot be made from which of the following substances?

A. Iron

B. Nickel

C. Copper

D. Cobalt

**Answer: C**



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**25.** 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: B**



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26. For diamagnetic materials magnetic susceptibility is

A. small and negative

B. small and positive

C. large and negative

D. large and positive

**Answer: A**



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27. 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**

28. Magnetic permeability is maximum for

A. diamagnetic substance

B. paramagnetic substance

C. ferromagnetic substance

D. all of these

**Answer: C**



**Watch Video Solution**

29. 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: C**



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30. A substance is placed in a non uniform magnetic field. It experiences weak force towards the strong field. The substance is \_\_\_\_\_ type.

A. Ferromagnetic

B. diamagnetic

C. Paramagnetic

D. None of these

**Answer: C**



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31. Of the following, paramagnetic substance is

A. Iron

B. Aluminium

C. Nickel

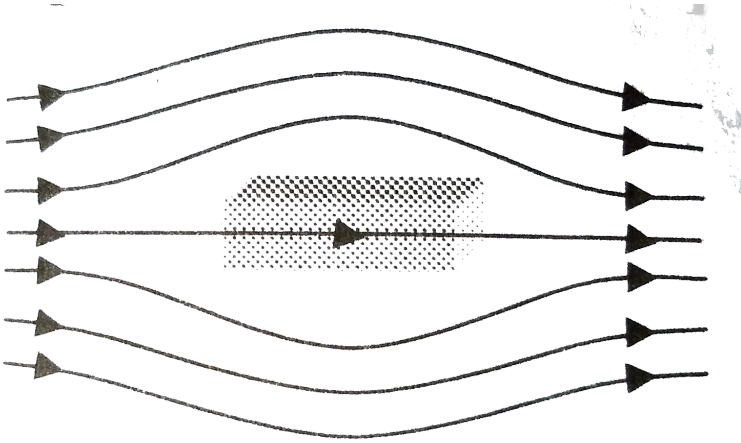
D. Copper

**Answer: B**



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32. The given figure represents a material which is



A. paramagnetic

B. diamagnetic

C. ferromagnetic

D. None of these

**Answer: B**



**Watch Video Solution**

**33.** 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 all three of them

B. Attract  $N_1$  strongly,  $N_2$  weakly and repel

$N_3$  weakly

C. Attract  $N_1$  strongly but repel and  $N_3$

weakly

D. Attract  $N_1$  and  $N_2$  strongly but  $N_2$

repel  $N_3$

**Answer: B**



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34. If the magnetic dipole moment of an atom of diamagnetic material, paramagnetic material and ferromagnetic material are denoted by  $\mu_d$ ,  $\mu_p$  and  $\mu_f$  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: C**



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**35.** 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. A is of a non-magnetic material

B. B is of a paramagnetic material

C. C is of a diamagnetic material

D. D is of a ferromagnetic material

**Answer: B**



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**36.** The magnetic susceptibility of a paramagnetic material is  $1.0 \times 10^{-5}$  at  $27^\circ C$  temperature. Then, at what temperature its magnetic susceptibility would be  $1.5 \times 10^{-5}$  ?

A.  $18^{\circ} C$

B.  $200^{\circ} C$

C.  $-73^{\circ} C$

D.  $-18^{\circ} C$

**Answer: C**



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**37.** The magnetic susceptibility of a paramagnetic material at  $-73^{\circ} C$  is 0.0075, its value at  $-173^{\circ} C$  will be

A. 0.015

B. 0.0045

C. 0.0075

D. 0.0030

**Answer: A**



**Watch Video Solution**

**38.** Temperature above which a ferromagnetic substance becomes paramagnetic is called

A. Critical temperature

B. Boyle's temperature

C. Debye's temperature

D. Curie temperature

**Answer: D**



**Watch Video Solution**

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

- A. Ferromagnetic domains are perfectly arranged
- B. Ferromagnetic domains become random
- C. Ferromagnetic domains are not influenced
- D. Ferromagnetic material change itself into diamagnetic material

**Answer: B**



**Watch Video Solution**

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

A. Soft iron

B. Steel

C. Copper-nickel alloy

D. Air

**Answer: A**



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**41.** 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: D**



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**42.** A thin diamagnetic rod is placed vertically between the poles of an electromagnet. When the current in the electromagnet is switched on, then the diamagnetic rod is pushed up, out of the horizontal magnetic field. Hence the rod gains horizontal potential energy. the work required to do this comes from

A. the current source

B. the magnetic field

C. the lattice structure of the material of  
the rod

D. the induced electric field due to the  
changing magnetic field

**Answer: A**



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**43.** The magnetic flux near the axis and inside the air core solenoid of length  $60\text{cm}$  carrying current 'f' is  $1.57 \times 10^{-6}\text{Wb}$ . Its magnetic

moment will be (cross-sectional area of a solenoid is very small as compared to its length.

$$\mu_0 = 4\pi \times 10^{-7} \text{SI unit )}$$

A.  $0.25Am^2$

B.  $0.50Am^2$

C.  $0.75Am^2$

D.  $1Am^2$

**Answer: C**



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**44.** 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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**45.** 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. power loss

**Answer: C**



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46. An iron rod of length  $L$  and magnetic moment  $M$  is bent in the form of a semicircle.

Now its magnetic moment will be

A.  $M$

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

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

D.  $M\pi$

**Answer: B**



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47. 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. 1.6

B. 1.2

C. 0.16

D. 0.12

**Answer: C**



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**48.** When a ferromagnetic material is heated to temperature above its Curie temperature, the material

A. is permanently magnetized

B. remains ferromagnetic

C. behaves like a diamagnetic material

D. behaves like a paramagnetic material

**Answer: D**



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**49.** Assertion : Susceptibility is defined as the ratio of intensity of magnetisation  $I$  to magnetic intensity  $H$ .

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

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reason

is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False but, Reason is True

**Answer: C**



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**Evaluation Test**

1. A bar of diamagnetic substance is placed in a magnetic field with its length making angle  $\theta$  with the direction of the magnetic field. How will the bar behave ?

A. It will align itself parallel to the magnetic field

B. It will align itself perpendicular to the magnetic field

C. It will not show any change

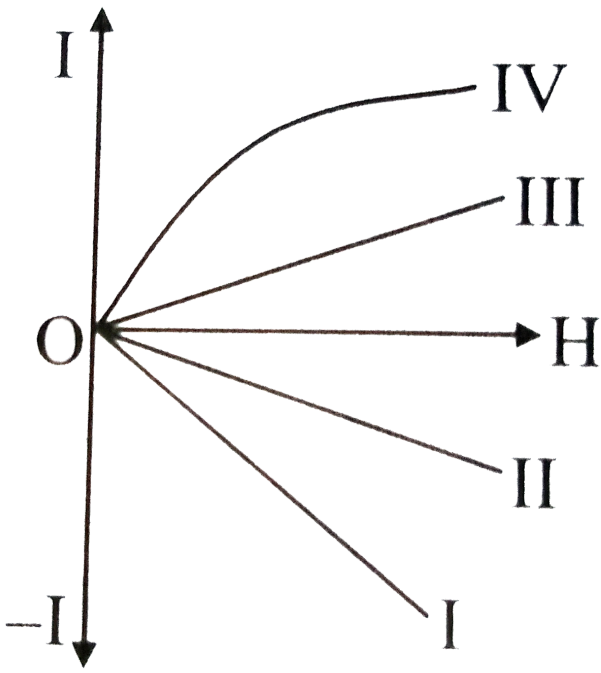
D. Its behaviour cannot be predicted

**Answer: B**



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2. The most appropriate I-H curve for a paramagnetic substance is



A. I

B. II

C. III

D. IV

**Answer: C**



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3. A solenoid has core of a material with relative permeability 500 and its windings carry a current of 1 A. The number of turns of the solenoid is 500per meter. The magnetization of the material is nearly

A.  $1.8 \times 10^5 Am^{-1}$

B.  $3.6 \times 10^5 Am^{-1}$

C.  $5.4 \times 10^5 \text{ Am}^{-1}$

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

**Answer: A**



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4. A charge  $2Q$  is circulating with constant speed  $2X$  in a semicircular loop of wire of radius  $r$ . The magnetic moment of this loop is

A.  $4QXr$



B.  $\frac{2\pi r Q X}{(\pi + 2)}$

C.  $\frac{4Q X r}{3}$

D.  $\frac{4Q X r}{\pi + 2}$

**Answer: B**



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5. The space within a current carrying toroid is filled with tungsten of susceptibility  $4.6 \times 10^{-5}$ . The percentage increase in the magnetic field is

A.  $2.3 \times 10^{-3}$

B.  $4.6 \times 10^{-3}$

C.  $6.9 \times 10^{-3}$

D.  $9.2 \times 10^{-3}$

**Answer: B**



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**6.** An iron rod of  $0.1 \text{ cm}^2$  cross-sectional area is subjected to a magnetising field of  $800 \text{ A/m}$ . If

the susceptibility of iron is 599, then magnetic flux produced in the rod is

A.  $6 \times 10^{-5} \text{ Wb}$

B.  $.6 \times 10^{-5} \text{ Wb}$

C.  $1.12 \times 10^{-5} \text{ Wb}$

D.  $2.24 \times 10^{-5} \text{ Wb}$

**Answer: B**



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7. A bar magnet having coercivity  $4 \times 10^3 \text{ Am}^{-1}$  is demagnetised by inserting it inside a solenoid 10 cm long and having 50 turns. The current that should be sent through the solenoid is

A. 1A

B. 4A

C. 8A

D. 16A

**Answer: C**



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8. A cylindrical rod magnet having length of 4 cm and a diameter of 1.2 cm has a uniform magnetization of  $4.20 \times 10^3 \text{ A/m}^3$ . Its magnetic dipole moment is

A.  $1.9 \times 10^{-2} \text{ J/T}$

B.  $3.8 \times 10^{-2} \text{ J/T}$

C.  $5.7 \times 10^{-2} \text{ J/T}$

D.  $7.6 \times 10^{-2} \text{ J/T}$

**Answer: A**



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**9.** The variation of magnetic susceptibility ( $\chi$ ) with magnetising field for a paramagnetic substance is

- A. (i) and (iii)
- B. (iii) and (iv)
- C. (ii) and (iii)
- D. (ii) and (iv)

**Answer: D**



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**10.** A toroid has 1500 turns and the inner and outer radii of its core 6 cm and 8 cm respectively. The magnetic field in the core for a current of 0.5 A is 2 T. The relative permeability of core is

A. 156.3

B. 662.2

C. 931.5

D. 1863

**Answer: C**



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**11.** An iron rod of volume  $10^{-4} m^3$  and relative permeability 900 is placed inside a long solenoid wound with 6 turns/cm. If a current of 0.4 A is passed through the solenoid, the magnetic moment of the rod is



A.  $0.216 \text{ Am}^2$

B.  $2.16 \text{ Am}^2$

C.  $21.6 \text{ Am}^2$

D.  $2.16 \times 10^{-2} \text{ Am}^2$

**Answer: C**

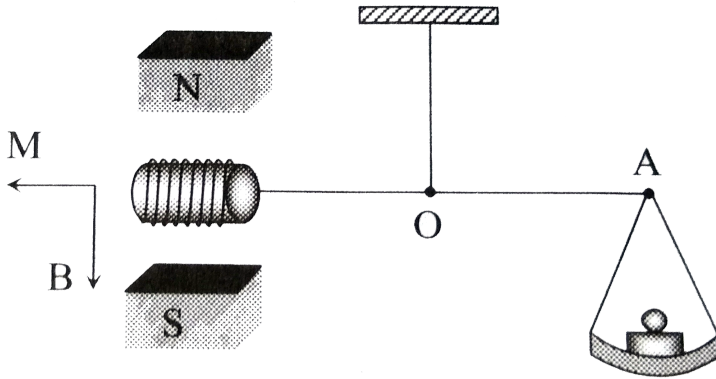


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**12.** A small coil C with  $N = 100$  turns is mounted on one end of a balance beam and introduced between the poles of an electromagnet as

shown in the figure. The cross-sectional area of coil is  $A = 1.0 \text{ cm}^2$ , length of arm OA of the balance beam is  $l = 20 \text{ cm}$ . When there is no current in the coil, the balance is in equilibrium. On passing a current  $i = 18 \text{ mA}$  through the coil, the equilibrium is restored by putting the additional counter weight of mass  $\Delta m = 40 \text{ mg}$  on the balance pan. Find the magnetic induction at the spot where coil

is located.



A. 0.11 T

B. 0.22 T

C. 0.44 T

D. 0.54 T

**Answer: C**



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**13. Assertion :** Intensity of magnetization is directly proportional to susceptibility.

**Reason :** Susceptibility is defined as the ratio of magnetic intensity (H) to the intensity of magnetization (I)

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not be correct explanation of assertion

C. If assertion is true but reason is false

D. If assertion is false but reason is true

**Answer: C**



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**14. Assertion :** Any instrument can be protected from external magnetic field by putting inside a wooden box.

**Reason :** Iron is a magnetic substance.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not be correct explanation of assertion

C. If assertion is true but reason is false

D. If assertion is false but reason is true

**Answer: D**



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