CHAPTER

22

Magnetic Properties

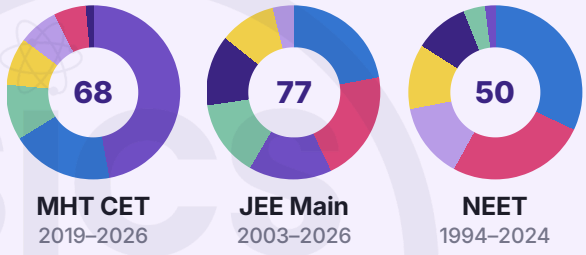
MHT CET · JEE · NEET Physics

PHYSICS CIRCLE

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EXAM WEIGHTAGE



MHT CET 2019–2026 · **JEE Main** 2003–2026 · **NEET** 1994–2024

	CET	JEE	NEET
Magnetic Materials & Curie Law	13 19%	17 22%	16 32%
Magnetisation: B, H, M, χ & μ	32 47%	12 16%	1 2%
Field of a Magnet & Magnet in a Uniform Field	4 6%	16 21%	13 26%
Vibration Magnetometer	6 9%	8 10%	6 12%
Hysteresis, Soft Iron vs Steel & Shielding	7 10%	11 14%	2 4%
Earth's Magnetism	1 1%	10 13%	5 10%
Bar Magnet & Magnetic Moment	5 7%	3 4%	7 14%

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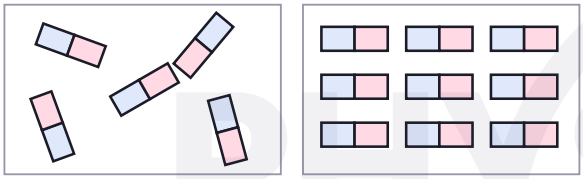
01 CONCEPT Bar Magnet & Magnetic Moment

IN ONE LINE

A magnet is a **dipole**: two equal and opposite poles a small distance apart, with moment M from S to N.

22.1.1 What is inside a magnet

- Weber and Ewing: every molecule is a tiny magnet.
- Unmagnetised: molecular magnets are random, net moment zero.
- Magnetised: they line up, so a net moment appears.



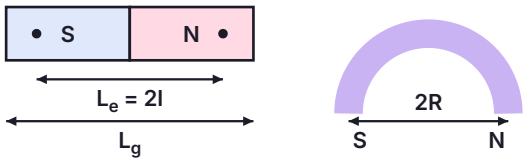
Molecular magnets

22.1.2 Effective and geometric length

- Poles are not exactly at the ends.
- Effective length is the distance between the poles.

$$L_e = 2l = \frac{5}{6} L_g$$

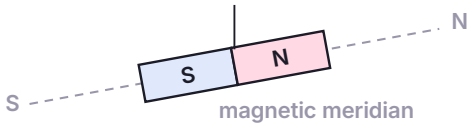
- Semicircular magnet: $L_g = \pi R$, $L_e = 2R$.



Effective and geometric lengths

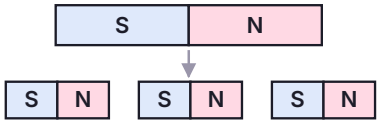
22.1.3 Properties of a magnet

- **Directive:** a freely suspended magnet rests in the N-S direction (magnetic meridian).



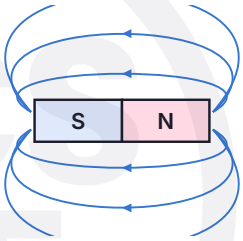
Freely suspended magnet

- **No monopole:** break a magnet and each piece has two poles.

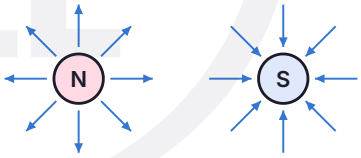


Each piece is a complete magnet

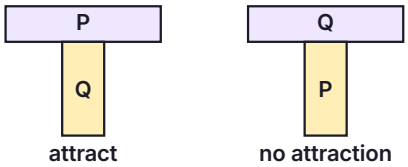
- Field lines are closed loops: S to N inside, N to S outside.
- **Repulsion** is the sure test of magnetism: attraction also happens with plain iron.



Lines form closed loops



Imaginary isolated poles



Only Q is a magnet

22.1.4 Pole strength (m)

- Scalar. N pole +m, S pole −m.
- SI unit: A m. Dimensions: [LA].
- Depends on material and area of cross-section.
- Does **not** depend on length.

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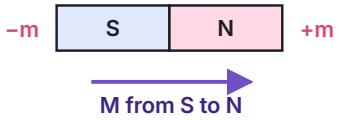


More area, more pole strength

22.1.5 Magnetic moment (M)

$$M = m(2l)$$

- Vector from S to N.
- SI unit: A m^2, also J/T. Dimensions: $[AL^2]$.

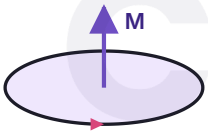


Direction of M

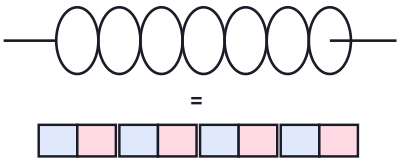
22.1.6 Current loop as a magnet

$$M = NIA$$

- Direction: curl fingers along I; thumb gives M.
- Solenoid = many dipoles in a line.
- Toroid and straight wire: M = 0.
- Atoms with all electrons paired: M = 0.



Moment of a loop



Solenoid behaves as a bar magnet

- A wire of length L bent into one circle:

$$M = \frac{IL^2}{4\pi}$$

- Charge q moving in a circle of radius R at speed v:

$$M = \frac{qvR}{2}$$

- Electron: $\vec{L}$ and $\vec{M}$ are opposite, angle 180°.
- Bohr magneton is the natural unit:

$$\mu_B = \frac{eh}{4\pi m} = 9.27 \times 10^{-24}\ A\ m^2$$

22.1.7 Cutting a magnet

Cut into n parts	m′	M′
across the length	m	$\frac{M}{n}$
along the length	$\frac{m}{n}$	$\frac{M}{n}$

22.1.8 Bending a magnet

- m is unchanged. Use the new end-to-end distance.

$$M' = M \times \frac{\text{end-to-end distance}}{\text{length}}$$



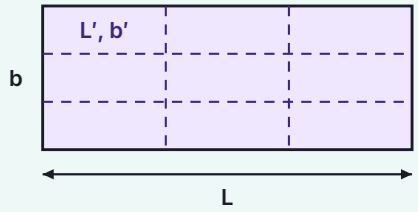
New length is the chord

Shape	M′
semicircle	$\frac{2M}{\pi}$
arc of 60°	$\frac{3M}{\pi}$
bent at the middle at 60°	$\frac{M}{2}$
bent at the middle at 90°	$\frac{M}{\sqrt{2}}$

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JEE · NEET Corner

Cutting a rectangular magnet into n equal parts



Cut along and across the length at the same time

- Applies when cut both along and across, n parts in all.

$$L' = \frac{L}{\sqrt{n}} \cdot b' = \frac{b}{\sqrt{n}} \cdot w' = \frac{w}{n}$$

$$m' = \frac{m}{\sqrt{n}} \cdot M' = \frac{M}{n}$$

$$I = w\,\frac{L^2 + b^2}{12} \cdot I' = \frac{I}{n^2}$$

Cutting a thin magnet across its length

$$L' = \frac{L}{n} \cdot w' = \frac{w}{n} \cdot M' = \frac{M}{n} \cdot I' = \frac{I}{n^3}$$

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Solved Examples 01 Bar Magnet & Magnetic Moment

SOLVED 1 JEE Main 2025 · 7 Apr · Shift 2

Assertion (A): Magnetic monopoles do not exist.
Reason (R): Magnetic field lines are continuous and form closed loops. Choose the most appropriate answer.

(a) Both (A) and (R) are correct and (R) is the correct explanation of (A)
(b) (A) is not correct but (R) is correct
(c) (A) is correct but (R) is not correct
(d) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

STEP 1 Breaking a magnet always gives two poles: no isolated pole exists
STEP 2 Field lines have no start or end, so they form closed loops
STEP 3 Closed loops mean no monopole: **(A) and (R) correct, (R) explains (A)**

Answer: **(a)**

SOLVED 2 AIEEE 2003

The magnetic lines of force inside a bar magnet

(a) are from north-pole to south-pole of the magnet
(b) do not exist
(c) depend upon the area of cross-section of the bar magnet
(d) are from south-pole to north-pole of the magnet

STEP 1 Outside the magnet the lines go from N to S
STEP 2 They must close into a loop
STEP 3 So inside they go **from S to N**

Answer: **(d)**

SOLVED 3 MHT CET 2026 · 14 May · Shift 1

The angle made by an electron's orbital angular momentum (L) with the direction of the orbital magnetic moment (M) is

(a) 120° (b) 60°
(c) 180° (d) 90°

STEP 1 Electron charge is negative
STEP 2 Its current is opposite to its motion
STEP 3 So L and M are opposite: angle = **180°**

Answer: **(c)**

SOLVED 4 MHT CET 2024 · 4 May · Shift 1

The magnetic moments of two closely wound circular coils A and B of radius r_A = 10 cm and r_B = 20 cm are equal if (N_A, I_A and N_B, I_B are turns and current of A and B)

(a) $2N_AI_A = N_BI_B$
(b) $N_A = 2N_B$
(c) $N_AI_A = 4N_BI_B$
(d) $4N_AI_A = N_BI_B$

STEP 1 $M = NIA = NI\,\pi r^2$
STEP 2 $N_AI_A\,(10)^2 = N_BI_B\,(20)^2$
STEP 3 $\mathbf{N_AI_A = 4N_BI_B}$

Answer: **(c)**

SOLVED 5 MHT CET 2021 · 24 Sep · Shift 1

A current I is flowing in a conductor of length L. When it is bent in the form of a circular loop, its magnetic moment will be

(a) $\frac{IL}{4\pi^2}$ (b) $4\pi L^2$
(c) $\frac{4\pi}{IL^2}$ (d) $\frac{IL^2}{4\pi}$

STEP 1 $2\pi r = L \Rightarrow r = \frac{L}{2\pi}$
STEP 2 $M = I\,\pi r^2 = I\,\pi\,\frac{L^2}{4\pi^2}$
STEP 3 $M = \mathbf{\frac{IL^2}{4\pi}}$

Answer: **(d)**

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Solved Examples 01 Bar Magnet & Magnetic Moment (contd.)

SOLVED 6 AIPMT 2007

A charged particle (charge q) is moving in a circle of radius R with uniform speed v. The associated magnetic moment μ is given by

(a) qvR^2 (b) $\frac{qvR^2}{2}$

(c) qvR (d) $\frac{qvR}{2}$

STEP 1 $I = \frac{q}{T} = \frac{qv}{2\pi R}$

STEP 2 $\mu = I\pi R^2 = \frac{qv}{2\pi R}\pi R^2$

STEP 3 $\mu = \mathbf{\frac{qvR}{2}}$

Answer: **(d)**

SOLVED 7 NEET 2021

A uniform wire of length 12a carrying current I is wound into a coil in the shape of (i) an equilateral triangle of side a, (ii) a square of side a. The magnetic dipole moments in each case are

(a) $4Ia^2$ and $3Ia^2$

(b) $\sqrt{3}\,Ia^2$ and $3Ia^2$

(c) $3Ia^2$ and Ia^2

(d) $3Ia^2$ and $4Ia^2$

STEP 1 Triangle: turns = $\frac{12a}{3a} = 4$; $M = 4I\left(\frac{\sqrt{3}}{4}a^2\right) = \sqrt{3}\,Ia^2$

STEP 2 Square: turns = $\frac{12a}{4a} = 3$; $M = 3I\,a^2$

STEP 3 **$\sqrt{3}\,Ia^2$ and $3Ia^2$**

Answer: **(b)**

SOLVED 8 MHT CET 2023 · 9 May · Shift 2

A thin rod of length L has magnetic moment M when magnetised. If the rod is bent in a semicircular arc, what is the magnetic moment in the new shape?

(a) $\frac{M}{L}$ (b) $\frac{M}{\pi}$

(c) $\frac{M}{2\pi}$ (d) $\frac{2M}{\pi}$

STEP 1 Pole strength $m = \frac{M}{L}$ stays the same

STEP 2 $\pi r = L \Rightarrow$ end-to-end distance $2r = \frac{2L}{\pi}$

STEP 3 $M' = m(2r) = \mathbf{\frac{2M}{\pi}}$

Answer: **(d)**

SOLVED 9 AIPMT 1997

A bar magnet of magnetic moment M is cut into two parts of equal length. The magnetic moment of each part will be

(a) M (b) 2M

(c) zero (d) 0.5 M

STEP 1 Cut across the length: pole strength stays m

STEP 2 Length becomes $\frac{L}{2}$

STEP 3 $M' = m\frac{L}{2} = \mathbf{0.5\,M}$

Answer: **(d)**

SOLVED 10 NEET 2013

A bar magnet of length l and magnetic dipole moment M is bent in the form of an arc subtending 60° at the centre. The new magnetic dipole moment will be

(a) $\frac{2}{\pi}M$ (b) $\frac{M}{2}$

(c) M (d) $\frac{3}{\pi}M$

STEP 1 $l = r\frac{\pi}{3} \Rightarrow r = \frac{3l}{\pi}$

STEP 2 Arc of 60°: chord (end-to-end distance) = r

STEP 3 $M' = \frac{M}{l} \times \frac{3l}{\pi} = \mathbf{\frac{3M}{\pi}}$

Answer: **(d)**

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MAGNETIC PROPERTIES

LEVEL 1 · EASY

Topic-wise Previous Year Questions

MHT CET · NEET · JEE Main

116	23	7
questions	concepts	topics

CONTENTS

01	Bar Magnet & Magnetic Moment	Q 1–8	8 Qs
02	Magnetisation: B, H, M, χ & μ	Q 9–40	32 Qs
03	Field of a Magnet & Magnet in a Uniform Field	Q 41–52	12 Qs
04	Earth's Magnetism	Q 53–59	7 Qs
05	Vibration Magnetometer	Q 60–61	2 Qs
06	Magnetic Materials & Curie Law	Q 62–98	37 Qs
07	Hysteresis, Soft Iron vs Steel & Shielding	Q 99–116	18 Qs
	Answer key		

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TOPIC 01

Bar Magnet & Magnetic Moment

8 PYQs · Easy 8 · Medium 0 · Difficult 0 | MHT CET 3 · NEET 3 · JEE 2

Concepts covered: Poles, monopoles & field lines (2) · Magnetic moment of a magnet & a current loop (2) · Cutting & bending a magnet (4)

LEVEL 1 · EASY 8 questions

◆ Poles, monopoles & field lines 2 Qs

1. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Magnetic monopoles do not exist.
Reason (R): Magnetic field lines are continuous and form closed loops.
In the light of the above statements, choose the most appropriate answer from the options given below:
JEE MAIN 2025 · 7 APR · SHIFT 2
(a) Both (A) and (R) are correct and (R) is the correct explanation of (A)
(b) (A) is not correct but (R) is correct
(c) (A) is correct but (R) is not correct
(d) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

2. The magnetic lines of force inside a bar magnet
AIEEE 2003
(a) are from north-pole to south-pole of the magnet
(b) do not exist
(c) depend upon the area of cross-section of the bar magnet
(d) are from south-pole to north-pole of the Magnet

◆ Magnetic moment of a magnet & a current loop 2 Qs

3. The angle made by electron's orbital angular momentum (L) with the direction of the orbital magnetic moment (M) is
MHT CET 2026 · 14 MAY · SHIFT 1
(a) 120° (b) 60° (c) 180° (d) 90°

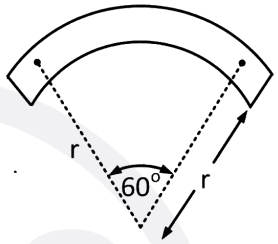
4. A charged particle (charge q) is moving in a circle of radius R with uniform speed v. The associated magnetic moment μ is given by
AIPMT 2007
(a) qvR^2 (b) $qvR^2/2$ (c) qvR (d) qvR/2

◆ Cutting & bending a magnet 4 Qs

5. A thin rod of length L has magnetic moment M when magnetised. If rod is bent in a semicircular arc what is magnetic moment in new shape?
MHT CET 2023 · 9 MAY · SHIFT 2
(a) $\frac{M}{L}$ (b) $\frac{M}{\pi}$ (c) $\frac{M}{2\pi}$ (d) $\frac{2M}{\pi}$

6. A steel wire of length / has a magnetic moment M. It is then bent into a semicircular arc. The new magnetic moment is
MHT CET 2020 · 19 OCT · SHIFT 2
(a) $M \times \ell$ (b) $\frac{M}{\ell}$ (c) $\frac{2M}{\pi}$ (d) M

7. A bar magnet of length 'l' and magnetic dipole moment 'M' is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be
NEET 2013



(a) $\frac{2}{\pi}M$ (b) $\frac{M}{2}$ (c) M (d) $\frac{3}{\pi}M$

8. A bar magnet of magnetic moment M is cut into two parts of equal length. The magnetic moment of each part will be
AIPMT 1997
(a) M (b) $2M$ (c) zero (d) $0.5\,M$

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TOPIC 02

Magnetisation: B, H, M, χ & μ

32 PYQs · Easy 32 · Medium 0 · Difficult 0 | MHT CET 20 · NEET 1 · JEE 11

Concepts covered: Definitions & units (1) · Intensity of magnetisation: M = m/V (3) · Permeability: B = μH (7) · Relations: B = μ0(H + M), μr = 1 + χ (13) · Solenoid & toroid with a core (8)

LEVEL 1 · EASY 32 questions

◆ Definitions & units 1 Q

9. Match List - I with List - II.

List - I	List - II
(A) Magnetic induction	(I) Ampere meter^2
(B) Magnetic intensity	(II) Weber
(C) Magnetic flux	(III) Gauss
(D) Magnetic moment	(IV) Ampere meter^{-1}

Choose the correct answer from the options given below:

JEE MAIN 2025 · 29 JAN · SHIFT 2

(a) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)
(b) (A)-(III), (B)-(II), (C)-(I), (D)-(IV)
(c) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)
(d) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

◆ Intensity of magnetisation: M = m/V 3 Qs

10. A bar magnet has length 4 cm, cross-sectional area $2\ \text{cm}^2$ and magnetic moment 6Am^2. The intensity of magnetisation of bar magnet is

MHT CET 2024 · 11 MAY · SHIFT 1

(a) $9 \times 10^5\ \text{A/m}$ (b) $7.5 \times 10^5\ \text{A/m}$
(c) $4.5 \times 10^5\ \text{A/m}$ (d) $3.0 \times 10^5\ \text{A/m}$

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

MHT CET 2021 · 23 SEP · SHIFT 1

(a) $2 \times 10^5\ \text{A/m}$ (b) $3 \times 10^5\ \text{A/m}$
(c) $4 \times 10^5\ \text{A/m}$ (d) $5 \times 10^5\ \text{A/m}$

12. The magnetization of bar magnet of length 5 cm, cross sectional area $2\ \text{cm}^2$ and net magnetic moment 1Am^2 is

MHT CET 2019 · 2 MAY · SHIFT 2

(a) $3 \times 10^5\ \text{A/m}$ (b) $4 \times 10^5\ \text{A/m}$
(c) $2 \times 10^5\ \text{A/m}$ (d) $1 \times 10^5\ \text{A/m}$

◆ Permeability: B = μH 7 Qs

13. A magnetising field of 5000 A/m produces a magnetic flux of 4×10^{-5} Wb in an iron rod of cross- sectional area $0.4\ \text{cm}^2$. The permeability of the rod (in Wb/Am) is

MHT CET 2026 · 15 MAY · SHIFT 1

(a) 4×10^{-6} (b) 1×10^{-3} (c) 2×10^{-4} (d) 3×10^{-5}

14. An iron rod is placed parallel to magnetic field of intensity H. The magnetic flux through the rod is Φ and its cross-sectional area is A. The magnetic permeability (μ) of the rod is

MHT CET 2026 · 13 MAY · SHIFT 1

(a) ΦAH (b) $\frac{AH}{\Phi}$ (c) $\frac{\Phi}{AH}$ (d) $A/\Phi H$

15. An iron rod is placed parallel to magnetic field intensity 1000 A/m. The magnetic flux through the rod is 3×10^{-4} Wb and its cross-sectional area is $1.5\ \text{cm}^2$. The magnetic permeability of rod in Wb/A-m is

MHT CET 2026 · 15 APR · SHIFT 2

(a) 2×10^{-2} (b) 2×10^{-3} (c) 2×10^{-4} (d) 1×10^{-2}

16. An iron rod is placed parallel to magnetic field intensity 2000 A/m. The magnetic flux through rod is 6×10^{-4} wb and its cross sectional area is 3 cm^2. The magnetic permeability of the rod in wb/A-m is

MHT CET 2026 · 13 APR · SHIFT 1

(a) 10^{-1} (b) 10^{-2} (c) 10^{-3} (d) 10^{-4}

17. A magnetic intensity of $500\ \text{A/m}$, produces a magnetic flux of 2.4×10^{-5} Wb in an iron bar of cross- sectional area $0.4\ \text{cm}^2$. The magnetic permeability of the iron bar is

MHT CET 2024 · 4 MAY · SHIFT 2

(a) $2.4 \times 10^{-3}\ \text{N/m}^2$ (b) $1.2 \times 10^{-3}\ \text{N/m}^2$
(c) $2.4 \times 10^{-4}\ \text{N/m}^2$ (d) $1.2 \times 10^{-4}\ \text{N/m}^2$

18. An iron rod is placed parallel to magnetic field of intensity $2000\ \text{A/m}$. The magnetic flux through the rod is 6×10^{-4} Wb and its cross-sectional area is $3\ \text{cm}^2$. The magnetic permeability of the rod in $\frac{\text{Wb}}{\text{A-m}}$ is

MHT CET 2020 · 16 OCT · SHIFT 1

(a) 10^{-1} (b) 10^{-2} (c) 10^{-4} (d) 10^{-3}

19. A magnetizing field of $5000\ \text{A/m}$ produces a magnetic flux of 4×10^{-5} Wb in an iron rod of cross-sectional area $0.4\ \text{cm}^2$. The permeabilit of the rod in Wb/A-m, is

MHT CET 2019 · 3 MAY · SHIFT 1

(a) 4×10^{-6} (b) 1×10^{-3} (c) 2×10^{-4} (d) 3×10^{-5}

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◆ Relations: B = μ0(H + M), μr = 1 + χ 13 Qs

20. The relationship between the magnetic susceptibility (χ) and magnetic permeability (μ) of a material is (μ_0 and μ_r is the permeability of free space and relative permeability respectively)

MHT CET 2026 · 15 MAY · SHIFT 2

(a) $\chi = \frac{\mu}{\mu_0} - 1$ (b) $\chi = \frac{\mu_r}{\mu_0} + 1$

(c) $\chi = \mu_r + 1$ (d) $\chi = 1 - \frac{\mu}{\mu_0}$

21. The relation between total magnetic field (B), magnetic intensity (H), permeability of free space (μ_0) and susceptibility (χ) is

MHT CET 2026 · 12 MAY · SHIFT 2

(a) $\frac{B}{H} = \mu_0(1+\chi)$ (b) $BH = \mu_0(1+\chi)$

(c) $\frac{H}{B} = \mu_0(1-\chi)$ (d) $\frac{H}{B} = \mu_0(1+\chi)$

22. The magnetic susceptibility of iron is 5499. The relative permeability of iron will be

MHT CET 2025 · 20 APR · SHIFT 1

(a) 5500×10^7 (b) 5500×10^{-7}

(c) 5500 (d) 5501

23. If M is the magnetisation induced in the material, H is the magnetic field intensity, B is the net magnetic field inside the material then the correct relation between them is (μ_0 = permeability of free space)

MHT CET 2025 · 19 APR · SHIFT 2

(a) $\mathrm{B} = \frac{\mu_0}{(\mathrm{H}+\mathrm{M})}$ (b) $B = \mu_0(H - M)$

(c) $\mathrm{B} = \frac{\mu_0}{(\mathrm{H}-\mathrm{M})}$ (d) $B = \mu_0(H + M)$

24. The correct relation between total magnetic field (B), magnetic intensity (H), permeability of free space (μ_0) and susceptibility (χ) is

MHT CET 2024 · 9 MAY · SHIFT 2

(a) $\frac{B}{H} = \mu_0(1-\chi)$ (b) $\frac{\mathrm{B}}{\mathrm{H}} = \mu_0(1+\chi)^2$

(c) $\frac{\mathrm{B}}{\mathrm{H}} = \mu_0(1+\chi)$ (d) $\frac{\mathrm{B}}{\mathrm{H}} = \mu_0(1-\chi)^2$

25. The relation between total magnetic field (B), magnetic intensity (H), permeability of free space (μ_0) and susceptibility (χ) is

MHT CET 2024 · 3 MAY · SHIFT 1

(a) $\frac{\mathrm{H}}{\mathrm{B}} = \mu_0(1+\chi)$ (b) $\frac{B}{H} = \mu_0(1+\chi)$

(c) $\frac{\mathrm{H}}{\mathrm{B}} = \mu_0(\chi - 1)$ (d) $\frac{B}{H} = \mu_0(1-x)$

26. The relative permeability of iron is 2000. Its absolute permeability in SI unit will be $\left(\frac{\mu_0}{4\pi} = 10^{-7}\text{SI unit}\right)$

MHT CET 2021 · 22 SEP · SHIFT 2

(a) $8\pi \times 10^{-7}$ (b) $4\pi \times 10^{-5}$

(c) $8\pi \times 10^{-4}$ (d) $\frac{500}{\pi} \times 10^{-7}$

27. The permeability of a metal is $0.1256\ \mathrm{TmA}^{-1}$. Its relative permeability will be $\left(\frac{\mu_0}{4\pi} = 10^{-7}\ \mathrm{SI\,unit}\right)$ ($\pi = 3.14$)

MHT CET 2021 · 22 SEP · SHIFT 1

(a) 10^5 (b) 3×10^5 (c) 2×10^6 (d) 10^4

28. What is susceptibility of a medium, if its relative permeability is 0.85?

MHT CET 2021 · 21 SEP · SHIFT 1

(a) 1.85 (b) 0.15 (c) −0.15 (d) −0.85

29. An iron rod of susceptibility 599 is subjected to a magnetizing field of 1200 A m-1. The permeability of the material of the rod is:
$\left(\mu_0 = 4\pi \times 10^{-7} TmA^{-1}\right)$

NEET 2020 · PHASE 1

(a) $8.0 \times 10^{-5} TmA^{-1}$ (b) $2.4\pi \times 10^{-5} TmA^{-1}$

(c) $2.4\pi \times 10^{-7} TmA^{-1}$ (d) $2.4\pi \times 10^{-4} TmA^{-1}$

30. The relationship between the magnetic susceptibility (χ) and the magnetic permeability (μ) is given by:
(μ_0 is the permeability of free space and μ_r is relative permeability)

JEE MAIN 2025 · 2 APR · SHIFT 1

(a) $\chi = \frac{\mu}{\mu_0} - 1$ (b) $\chi = \frac{\mu_r}{\mu_0} + 1$

(c) $\chi = \mu_r + 1$ (d) $\chi = 1 - \frac{\mu}{\mu_0}$

31. The susceptibility of a paramagnetic material is 99. The permeability of the material in Wb/A-m, is: [Permeability of free space $\mu_0 = 4\pi \times 10^{-7}$ Wb/A-m]

JEE MAIN 2022 · 27 JUN · SHIFT 1

(a) $4\pi \times 10^{-7}$ (b) $4\pi \times 10^{-4}$

(c) $4\pi \times 10^{-5}$ (d) $4\pi \times 10^{-6}$

32. The magnetic susceptibility of a material of a rod is 499. Permeability in vacuum is $4\pi \times 10^{-7}$ H/m. Absolute permeability of the material of the rod is:

JEE MAIN 2021 · 20 JUL · SHIFT 2

(a) $4\pi \times 10^{-4}$ H/m (b) $2\pi \times 10^{-4}$ H/m

(c) $3\pi \times 10^{-4}$ H/m (d) $\pi \times 10^{-4}$ H/m

◆ Solenoid & toroid with a core 8 Qs

33. 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 (μ_0 = permeability of vacuum, χ = magnetic susceptibility)

MHT CET 2025 · 5 MAY · SHIFT 2

(a) $\mu_0 \mathrm{ni}(1+\chi)$ (b) $\mu_0 \mathrm{ni}^2(1+\chi)$

(c) $\mu_0 ni\chi$ (d) $\mu_0\,\mathrm{ni}(1-\chi)$

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34. A solenoid has a core made of material with relative permeability 400. The magnetic field produced in the interior of solenoid is 1.0 T. The magnetic intensity in SI units is $\alpha \times 10^5$. The value of α is ____.
(Free space permeability $\mu_0 = 4\pi \times 10^{-7}$ SI units.)
JEE MAIN 2026 · 4 APR · SHIFT 2
(a) $\frac{25}{\pi}$ (b) $\frac{1}{16\pi}$ (c) $\frac{1}{\pi}$ (d) $\frac{1}{4\pi}$

35. The percentage increase in magnetic field (B) when space within a current carrying solenoid is filled with magnesium (magnetic susceptibility $\chi_{Mg} = 1.2 \times 10^{-5}$) is:
JEE MAIN 2025 · 7 APR · SHIFT 1
(a) $\frac{5}{3} \times 10^{-5}\%$ (b) $\frac{5}{6} \times 10^{-4}\%$
(c) $\frac{5}{6} \times 10^{-5}\%$ (d) $\frac{6}{5} \times 10^{-3}\%$

36. The free space inside a current carrying toroid is filled with a material of susceptibility 2×10^{-2}. The percentage increase in the value of magnetic field inside the toroid will be
JEE MAIN 2023 · 11 APR · SHIFT 1
(a) 0.1% (b) 1% (c) 2% (d) 0.2%

37. A solenoid of 1200 turns is wound uniformly in a single layer on a glass tube 2 m long and 0.2 m in diameter. The magnetic intensity at the center of the solenoid when a current of 2 A flows through it is:
JEE MAIN 2023 · 25 JAN · SHIFT 1
(a) $1\ \text{A m}^{-1}$ (b) $2.4 \times 10^{-3}\ \text{A m}^{-1}$
(c) $1.2 \times 10^{3}\ \text{A m}^{-1}$ (d) $2.4 \times 10^{3}\ \text{A m}^{-1}$

38. The space inside a straight current carrying solenoid is filled with a magnetic material having magnetic susceptibility equal to $1.2 \times 10^{-}5$. What is fractional increase in the magnetic field inside solenoid with respect to air as medium inside the solenoid?
JEE MAIN 2022 · 28 JUN · SHIFT 2
(a) 1.2×10^{-5} (b) 1.2×10^{-3}
(c) 1.8×10^{-3} (d) 2.4×10^{-5}

39. The magnetic intensity at the center of a long current carrying solenoid is found to be $1.6 \times 10^{3}\text{Am}^{-1}$. If the number of turns is 8 per cm, then the current flowing through the solenoid is _____ A.
JEE MAIN 2023 · 8 APR · SHIFT 1 *(Numerical)*

40. The value of aluminium susceptibility is $2.2 \times 10^{-}5$. The percentage increase in the magnetic field if space within a current carrying toroid is filled with aluminium is $\frac{x}{10^4}$. Then the value of x is _____.
JEE MAIN 2021 · 25 JUL · SHIFT 1 *(Numerical)*

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TOPIC 03

Field of a Magnet & Magnet in a Uniform Field

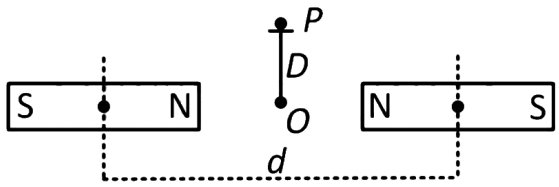
12 PYQs · Easy 12 · Medium 0 · Difficult 0 | MHT CET 1 · NEET 7 · JEE 4

Concepts covered: Field of a bar magnet (1) · Torque on a magnet or current loop (4) · Work & potential energy (7)

LEVEL 1 · EASY 12 questions

◆ Field of a bar magnet 1 Q

41. Two identical bar magnets are fixed with their centers at a distance d apart. A stationary charge Q is placed at P in between the gap of the two magnets at a distance D from the centre O as shown in the figure



The force on the charge Q is

AIPMT 2010 · MAINS

(a) zero
(b) directed along OP
(c) directed along PO
(d) directed perpendicular to the plane of paper

◆ Torque on a magnet or current loop 4 Qs

42. A bar magnet of magnetic moment M is placed at right angles to a magnetic induction B. If a force F is experienced by each pole of the magnet, the length of the magnet will be

NEET 2013

(a) MB/F (b) BF/M (c) MF/B (d) F/MB

43. A current loop in a magnetic field

NEET 2013

(a) can be in equilibrium in two orientations, both the equilibrium states are unstable.
(b) can be in equilibrium in two orientations, one stable while the other is unstable.
(c) experiences a torque whether the field is uniform or non uniform in all orientations.
(d) can be in equilibrium in one orientation.

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

AIPMT 1999

(a) $\vec{M} \cdot \vec{B}$ (b) $-\vec{M} \cdot \vec{B}$
(c) $\vec{M} \times \vec{B}$ (d) $-\vec{M} \times \vec{B}$

45. A magnetic needle is kept in a non-uniform magnetic field. It experiences:

AIEEE 2005

(a) neither a force nor a torque
(b) a torque but not a force
(c) a force but not a torque
(d) a force and a torque

◆ Work & potential energy 7 Qs

46. A magnetic dipole of magnetic moment M, is freely suspended in a magnetic field of induction B. The minimum and maximum values of potential energy of the dipole, respectively are

MHT CET 2021 · 24 SEP · SHIFT 2

(a) −MB, +MB (b) 0, MB
(c) 0, 2MB (d) MB, 0

47. The magnetic potential energy, when a magnetic bar of magnetic moment $\vec{m}$ is placed perpendicular to the magnetic field $\vec{B}$ is

NEET 2024

(a) $-\frac{mB}{2}$ (b) Zero (c) $-mB$ (d) mB

48. A short bar magnet of magnetic moment 0.4 J T^{-1} is placed in a uniform magnetic field of 0.16 T. The magnet is in stable equilibrium when the potential energy is

AIPMT 2011 · MAINS

(a) 0.064 J (b) – 0.064 J
(c) zero (d) – 0.082 J

49. A bar magnet having a magnetic moment of 2×10^4 J T^{-1} is free to rotate in a horizontal plane. A horizontal magnetic field B = 6×10^{-4} T exists in the space. The work done in taking the magnet slowly from a direction parallel to the field to a direction 60° from the field is

AIPMT 2009

(a) 12 J (b) 6 J (c) 2 J (d) 0.6 J

50. The magnetic moment of a bar magnet is 0.5 Am^2. It is suspended in a uniform magnetic field of 8×10^{-2} T. The work done in rotating it from its most stable to most unstable position is:

JEE MAIN 2024 · 4 APR · SHIFT 2

(a) 4×10^{-2} J (b) 16×10^{-2} J
(c) 8×10^{-2} J (d) Zero

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51. A bar magnet with a magnetic moment 5.0Am^2 is placed in parallel position relative to a magnetic field of 0.4 T. The amount of required work done in turning the magnet from parallel to antiparallel position relative to the field direction is _____.

JEE MAIN 2023 · 31 JAN · SHIFT 1

(a) zero (b) 1 J (c) 2 J (d) 4 J

52. A bar magnet having a magnetic moment of 2.0×10^5 JT $^-$ 1, is placed along the direction of uniform magnetic field of magnitude B = 14×10^{-5} T. The work done in rotating the magnet slowly through 60° from the direction of field is:

JEE MAIN 2022 · 26 JUN · SHIFT 2

(a) 14 J (b) 8.4 J (c) 4 J (d) 1.4 J

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TOPIC 04

Earth's Magnetism

7 PYQs · Easy 7 · Medium 0 · Difficult 0 | MHT CET 0 · NEET 4 · JEE 3

Concepts covered: Dip, BH, BV & Earth as a dipole (5) · Apparent dip (1) · Tangent galvanometer (1)

LEVEL 1 · EASY 7 questions

◆ Dip, BH, BV & Earth as a dipole 5 Qs

53. The relations amongst the three elements of earth's magnetic field, namely horizontal component H, vertical component V and dip δ are, (B_E = total magnetic field)

NEET 2019

(a) $V = B_E,\ H = B_E \tan\delta$
(b) $V = B_E \tan\delta,\ H = B_E$
(c) $V = B_E \sin\delta,\ H = B_E \cos\delta$
(d) $V = B_E \cos\delta,\ H = B_E \sin\delta$

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

AIPMT 2012 · PRELIMS

(a) will become rigif showing no movement
(b) will stay in any position
(c) will stay in north-south direction only
(d) will stay in east-west direction only

55. At a point A on the earth's surface the angle of dip, $\delta = +25°$. At a point B on the earth's surface the angle of dip, $\delta = -25°$. We can interpret that:

NEET 2019 *(Not in current JEE/NEET syllabus)*

(a) A is located in the southern hemisphere and B is located in the northern hemisphere.
(b) A is located in the northern hemisphere and B is located in the southern hemisphere.
(c) A and B are both located in the southern hemisphere.
(d) A and B are both located in the northern hemisphere.

56. The vertical component of the earth's magnetic field is 6×10^{-5} T at any place where the angle of dip is $37°$. The earth's resultant magnetic field at that place will be (Given $\tan 37° = \frac{3}{4}$)

JEE MAIN 2022 · 29 JUL · SHIFT 2 *(Not in current JEE/NEET syllabus)*

(a) 8×10^{-5} T (b) 6×10^{-5} T
(c) 5×10^{-4} T (d) 1×10^{-4} T

57. At a certain place the angle of dip is $30°$ and the horizontal component of earth's magnetic field is 0.5 G. The earth's total magnetic field (in G), at that certain place, is:

JEE MAIN 2022 · 29 JUN · SHIFT 1 *(Not in current JEE/NEET syllabus)*

(a) $\frac{1}{\sqrt{3}}$ (b) $\frac{1}{2}$ (c) $\sqrt{3}$ (d) 1

◆ Apparent dip 1 Q

58. Choose the correct option

JEE MAIN 2021 · 22 JUL · SHIFT 2 *(Not in current JEE/NEET syllabus)*

(a) True dip is always equal to apparent dip.
(b) True dip is not mathematically related to apparent dip.
(c) True dip is less than the apparent dip.
(d) True dip is always greater than the apparent dip.

◆ Tangent galvanometer 1 Q

59. Tangent galvanometer is used to measure

AIPMT 2001

(a) potential difference (b) current
(c) resistance (d) charge

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TOPIC 05

Vibration Magnetometer

2 PYQs · Easy 2 · Medium 0 · Difficult 0 | MHT CET 1 · NEET 1 · JEE 0

Concepts covered: Time period: T = 2π√(I/MB) (1) · Sum & difference positions (1)

LEVEL 1 · EASY 2 questions

◆ Time period: T = 2π√(I/MB) 1 Q

60. The periodic time of a magnet in vibration magnetometer is T_0. If a magnet is replaced by another magnet whose moment of inertia is three times and magnetic moment is one-third of the original magnet, then time period of new magnet will be

MHT CET 2026 · 20 APR · SHIFT 1

(a) $\frac{T_0}{3}$ (b) $\frac{T_0}{\sqrt{3}}$ (c) $3T_0$ (d) $\sqrt{3}T_0$

◆ Sum & difference positions 1 Q

61. Two bar magnets having same geometry with magnetic moments M and 2M, are firstly placed in such a way that their similar poles are same side then its time period of oscillation is T_1. Now the polarity of one of the magnet is reversed then time period of oscillation is T_2, then

AIPMT 2002

(a) $T_1 < T_2$ (b) $T_1 = T_2$ (c) $T_1 > T_2$ (d) $T_2 = \infty$

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TOPIC 06

Magnetic Materials & Curie Law

37 PYQs · Easy 37 · Medium 0 · Difficult 0 | MHT CET 12 · NEET 15 · JEE 10

Concepts covered: Dia, para & ferromagnetic properties (22) · Domains (2) · Curie law, χ-T graphs & Curie temperature (13)

LEVEL 1 · EASY 37 questions

◆ Dia, para & ferromagnetic properties 22 Qs

62. A diamagnetic liquid is filled in a U-tube. One arm of a U-tube is placed in an external magnetic field with the meniscus in line with the field. The level of the liquid in that arm will

MHT CET 2026 · 19 APR · SHIFT 1

(a) rise. (b) fall.
(c) oscillate slowly. (d) remains as it is.

63. Susceptibility of a paramagnetic substance is

MHT CET 2025 · 22 APR · SHIFT 1

(a) negative and large. (b) negative and small.
(c) positive and large. (d) positive and small.

64. The materials having negative magnetic susceptibility are

MHT CET 2024 · 16 MAY · SHIFT 1

(a) both paramagnetic and ferromagnetic.
(b) paramagnetic.
(c) diamagnetic.
(d) ferromagnetic.

65. For a paramagnetic substance, the magnetic susceptibility is

MHT CET 2020 · 19 OCT · SHIFT 2

(a) large and negative (b) small and positive
(c) large and positive (d) small and negative

66. A thin light weight rod of diamagnetic substance such as silver is suspended in uniform external magnetic field. It will align itself with its length

MHT CET 2020 · 16 OCT · SHIFT 2

(a) parallel to magnetic field
(b) perpendicular to magnetic field
(c) inclined at an angle 45° to magnetic field
(d) inclined at an angle 120° to magnetic field

67. Magnetic susceptibility of a paramagnetic substance is

MHT CET 2019 · 2 MAY · SHIFT 2

(a) large and positive (b) small and positive
(c) small and negative (d) large and negative

68. The incorrect relation for a diamagnetic material (all the symbols carry their usual meaning and ε is a small positive number) is

NEET 2024

(a) $\mu < \mu_0$ (b) $0 \le \mu_r < 1$
(c) $-1 \le \chi < 0$ (d) $1 < \mu_r < 1 + \varepsilon$

69. Match List I with List II

	List I (Material)		List II (Susceptibility ($$\chi$$))
A.	Diamagnetic	I.	$\chi = 0$
B.	Ferromagnetic	II.	$0 > \chi \ge -1$
C.	Paramagnetic	III.	$\chi >> 1$
D.	Non-magnetic	IV.	$0 < \chi < \varepsilon$ (a small positive number)

Choose the correct answer from the options given below.

NEET 2024

(a) A-II, B-III, C-IV, D-I
(b) A-II, B-I, C-III, D-IV
(c) A-III, B-II, C-I, D-IV
(d) A-IV, B-III, C-II, D-I

70. The magnetic susceptibility is negative for

NEET 2016 · PHASE 1

(a) ferromagnetic material only
(b) paramagnetic and ferromagnetic materials
(c) diamagnetic material only
(d) paramagnetic material only

71. There are four light-weight-rod samples 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?

AIPMT 2011 · PRELIMS

(a) B is of a paramagnetic material
(b) C is of a diamagnetic material
(c) D is of a ferromagnetic material
(d) A is of a non-magnetic material

72. The magnetic moment of a diamagnetic atom is

AIPMT 2010 · MAINS

(a) much greater than one (b) 1
(c) between zero and one (d) equal to zero

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73. If a diamagnetic substance is brought near the north or the south pole of a bar magnet, it is
AIPMT 2009
(a) repelled by the north pole and attracted by the south pole
(b) attracted by the north pole and repelled by the south pole
(c) attracted by both the poles
(d) repelled by both the poles

74. If the magnetic dipole moment of an atom of diamagnetic material, paramagnetic material and ferromagnetic material are denoted by μd, μp and μf respectively, then
AIPMT 2005
(a) $\mu_d = 0$ and $\mu p \neq 0$ (b) $\mu d \neq 0$ and $\mu p = 0$
(c) $\mu p = 0$ and $\mu f \neq 0$ (d) $\mu d \neq 0$ and $\mu f \neq 0$.

75. A diamagnetic material in a magnetic field moves
AIPMT 2003
(a) from stronger to the weaker parts of the field
(b) from weaker to the stronger parts of the field
(c) perpendicular to the field
(d) in none of the above directions

76. A diamagnetic substance is brought near a strong magnet, then it is
AIPMT 1999
(a) attracted by a magnet
(b) repelled by a magnet
(c) repelled by north pole and attracted by south pole
(d) attracted by north pole and repelled by south pole

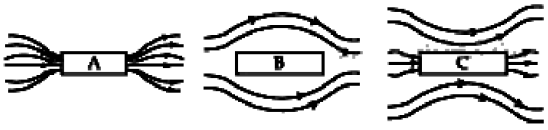
77. Paramagnetic substances:
A. align themselves along the directions of external magnetic field.
B. attract strongly towards external magnetic field.
C. has susceptibility little more than zero.
D. move from a region of strong magnetic field to weak magnetic field.
Choose the most appropriate answer from the options given below:
JEE MAIN 2024 · 8 APR · SHIFT 1
(a) A, B, C Only (b) A, C Only
(c) A, B, C, D (d) B, D Only

78. Given below are two statements:
Statement I: The diamagnetic property depends on temperature.
Statement II: The induced magnetic dipole moment in a diamagnetic sample is always opposite to the magnetizing field.
In the light of given statements, choose the correct answer from the options given below.
JEE MAIN 2023 · 12 APR · SHIFT 1
(a) Statement I is incorrect but Statement II is true.
(b) Statement I is correct but Statement II is false.
(c) Both Statement I and Statement II are False.
(d) Both Statement I and Statement II are true.

79. Given below are two statements:
Statement I: For diamagnetic substance, $-1 \leq \chi < 0$, where χ is the magnetic susceptibility. Statement II: Diamagnetic substances when placed in an external magnetic field, tend to move from stronger to weaker part of the field.
In the light of the above statements, choose the correct answer from the options given below
JEE MAIN 2023 · 10 APR · SHIFT 2
(a) Both Statement I and Statement II are true
(b) Statement I is correct but Statement II is false
(c) Both Statement I and Statement II are False
(d) Statement I is incorrect but Statement II is true.

80. An example of a perfect diamagnet is a superconductor. This implies that when a superconductor is put in a magnetic field of intensity B, the magnetic field B_s inside the superconductor will be such that:
JEE MAIN 2014 · 19 APR · SHIFT 1
(a) $B_s = -B$ (b) $B_s = 0$
(c) $B_s = B$ (d) $B_s < B$ but $B_s \neq 0$

81. Three identical bars A, B and C are made of different magnetic materials. When kept in a uniform magnetic field, the field lines around them look as follows:



Make the correspondence of these bars with their material being diamagnetic (D), ferromagnetic (F) and paramagnetic (P):
JEE MAIN 2014 · 11 APR · SHIFT 1
(a) A ↔ D, B ↔ P, C ↔ F (b) A ↔ F, B ↔ D, C ↔ P
(c) A ↔ P, B ↔ F, C ↔ D (d) A ↔ F, B ↔ P, C ↔ D

82. Relative permittivity and permeability of a material ε_r and μ_r, respectively. Which of the following values of these quantities are allowed for a diamagnetic material?
AIEEE 2008
(a) $\varepsilon_r = 0.5, \mu_r = 1.5$ (b) $\varepsilon_r = 1.5, \mu_r = 0.5$
(c) $\varepsilon_r = 0.5, \mu_r = 0.5$ (d) $\varepsilon_r = 1.5, \mu_r = 1.5$

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83. 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

AIEEE 2006

(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

◆ Domains 2 Qs

84. In a ferromagnetic material, below the curie temperature, a domain is defined as:

JEE MAIN 2021 · 25 FEB · SHIFT 2

(a) a macroscopic region with zero magnetization.
(b) a macroscopic region with saturation magnetization.
(c) a macroscopic region with randomly oriented magnetic dipoles.
(d) a macroscopic region with consecutive magnetic dipoles oriented in opposite direction.

85. A soft ferromagnetic material is placed in an external magnetic field. The magnetic domains:

JEE MAIN 2021 · 24 FEB · SHIFT 2

(a) may increase or decrease in size and change its orientation.
(b) increase in size but no change in orientation.
(c) decrease in size and changes orientation.
(d) have no relation with external magnetic field.

◆ Curie law, χ-T graphs & Curie temperature 13 Qs

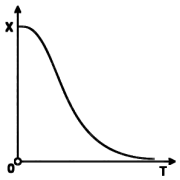
86. The product of magnetic susceptibility (χ) and absolute temperature (T) is constant for a

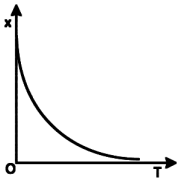
MHT CET 2026 · 15 APR · SHIFT 1

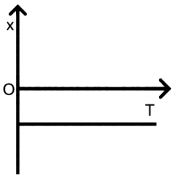
(a) diamagnetic substance.
(b) paramagnetic substance.
(c) ferromagnetic substance.
(d) paramagnetic as well as ferromagnetic substance.

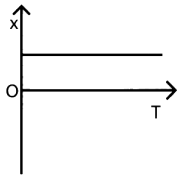
87. Which of the following figure best represents the variation of magnetic susceptibility (χ) with temperature for a diamagnetic substance?

MHT CET 2026 · 11 APR · SHIFT 1

(a) 

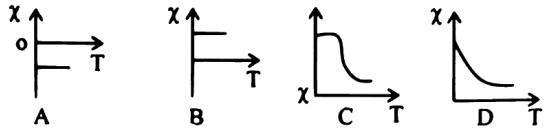
(b) 

(c) 

(d) 

88. The variation of magnetic susceptibility (χ) with temperature for a diamagnetic substance is shown correctly by graph

MHT CET 2025 · 21 APR · SHIFT 1



(a) D (b) B (c) A (d) C

89. A ferromagnetic material is heated above its curie temperature. The correct statement from the following is that

MHT CET 2024 · 2 MAY · SHIFT 2

(a) ferromagnetic domains are perfectly arranged.
(b) ferromagnetic domains become random.
(c) ferromagnetic domains are not influenced.
(d) ferromagnetic material changes itself into diamagnetic material.

90. For which of the following substances, the magnetic susceptibility is independent of temperature?

MHT CET 2023 · 13 MAY · SHIFT 1

(a) Diamagnetic only.
(b) Paramagnetic only.
(c) Ferromagnetic only.
(d) Diamagnetic and paramagnetic both.

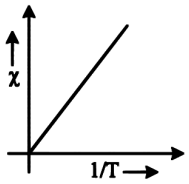
91. According to Curie's law in magnetism, the correct relation is (M = magnetization in paramagnetic sample, B = applied magnetic field, T = absolute temperature of the material, C = curie's constant)

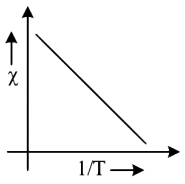
MHT CET 2023 · 10 MAY · SHIFT 1

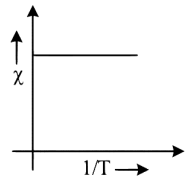
(a) $M = \frac{T}{CB}$ (b) $M = \frac{CB}{T}$ (c) $C = \frac{MB}{T}$ (d) $C = \frac{T^2}{MB}$

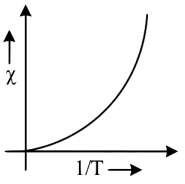
92. The variation of susceptibility (χ) with absolute temperature (T) for a paramagnetic material is represented as:

NEET 2023

(a) 

(b) 

(c) 

(d) 

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93. Curie temperature above which

AIPMT 2008

(a) paramagnetic material becomes ferromagnetic material
(b) ferromagnetic material becomes diamagnetic material
(c) ferromagnetic material becomes paramagnetic material
(d) paramagnetic material becomes diamagnetic material

---

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

AIPMT 2007

(a) anti ferromagnetism (b) no magnetic property
(c) diamagnetism (d) paramagnetism.

---

95. Curie temperature above which

AIPMT 2006

(a) paramagnetic material becomes ferromagnetic material
(b) ferromagnetic material becomes diamagnetic material
(c) ferromagnetic material becomes paramagnetic material
(d) paramagnetic material becomes diamagnetic material

---

96. According to Curie's law, the magnetic susceptibility of a substance at an absolute temperature T is proportional to

AIPMT 2003

(a) $1/T$ (b) T (c) $1/T^2$ (d) T^2

---

97. Among which the magnetic susceptibility does not depend on the temperature?

AIPMT 2001

(a) diamagnetism (b) paramagnetism
(c) ferromagnetism (d) ferrite.

---

98. Curie temperature is the temperature above which

AIEEE 2004

(a) a ferromagnetic material becomes paramagnetic
(b) a paramagnetic material becomes diamagnetic
(c) a ferromagnetic material becomes diamagnetic
(d) a paramagnetic material becomes ferromagnetic

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TOPIC 07

Hysteresis, Soft Iron vs Steel & Shielding

18 PYQs · Easy 18 · Medium 0 · Difficult 0 | MHT CET 7 · NEET 2 · JEE 9

Concepts covered: Hysteresis curve: retentivity & coercivity (4) · Demagnetising current (4) · Soft iron vs steel: choice of material (7) · Magnetic shielding (3)

LEVEL 1 · EASY 18 questions

◆ Hysteresis curve: retentivity & coercivity 4 Qs

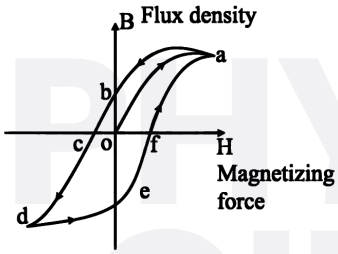
99. Magnetic hysteresis is exhibited by magnetic materials which are

MHT CET 2025 · 22 APR · SHIFT 2

(a) only paramagnetic
(b) only diamagnetic
(c) only ferromagnetic
(d) both para and ferromagnetic

100. In the following graph of flux density versus magnetizing force, coercivity and retentivity are respectively represented by the points

MHT CET 2024 · 10 MAY · SHIFT 1



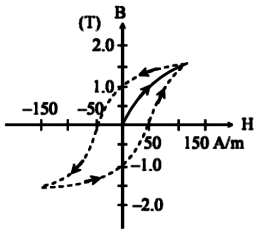
(a) c, b (b) a, o (c) d, c (d) f, e

101. In the hysteresis curve the value of magnetization (B) which will be present in a substance when value of magnetizing force (H) is made zero ($H = 0$) is called as

MHT CET 2023 · 14 MAY · SHIFT 2

(a) coercivity (b) retentivity
(c) domain (d) saturation

102.



The figure gives experimentally measured B vs H variation in a ferromagnetic material. The retentivity, coercivity and saturation, respectively, of the material are:

JEE MAIN 2020 · 7 JAN · SHIFT 2 *(Not in current JEE/NEET syllabus)*

(a) 1.0 T, 50A/m and 1.5 T
(b) 1.5 T, 50 A/m and 1.0 T
(c) 1.5 T, 50 A/m and 2.0 T
(d) 150 A/m, 1.0 T and 1.5 T

◆ Demagnetising current 4 Qs

103. A bar magnet is demagnetized by inserting it inside a solenoid of length 0.2 m, 100 turns, and carrying a current of 5.2 A. The coercivity of the bar magnet is:

JEE MAIN 2019 · 9 JAN · SHIFT 1

(a) 285 A/m (b) 2600 A/m (c) 520 A/m (d) 1200 A/m

104. The coercivity of a small magnet where the ferromagnet gets demagnetized is $3 \times 10^3\ Am^{-1}$. The current required to be passed in a solenoid of length $10\ cm$ and number of turns 100, so that the magnet gets demagnetized when inside the solenoid, is:

JEE MAIN 2014

(a) $30\ mA$ (b) $60\ mA$ (c) $3\ A$ (d) $6A$

105. The coercivity of a magnet is $5 \times 10^3\ \mathrm{A/m}$. The amount of current required to be passed in a solenoid of length 30 cm and the number of turns 150, so that the magnet gets demagnetised when inside the solenoid is _____ A.

JEE MAIN 2024 · 8 APR · SHIFT 2 *(Numerical)*

106. The current required to be passed through a solenoid of 15 cm length and 60 turns in order of demagnetise a bar magnet of magnetic intensity $2.4 \times 10^3\ Am^{-1}$ is _____ A.

JEE MAIN 2023 · 10 APR · SHIFT 1 *(Numerical)*

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◆ Soft iron vs steel: choice of material 7 Qs

107. Soft iron is used in making an electromagnet because
MHT CET 2026 · 19 MAY · SHIFT 2
(a) It has low permeability
(b) It has high coercivity
(c) It has high retentivity
(d) It has low retentivity

108. The materials suitable for making electromagnets should have
MHT CET 2023 · 9 MAY · SHIFT 1
(a) high retentivity and high coercivity
(b) low retentivity and low coercivity
(c) high retentivity and low coercivity
(d) low retentivity and high coercivity

109. Electromagnets are made of soft iron because soft iron has
AIPMT 2010 · PRELIMS
(a) low retentivity and high coercive force
(b) high retentivity and high coercive force
(c) low retentivity and low coercive force
(d) high retentivity and low coercive force

110. Given below are two statements: one is labelled as Assertion **A** and the other is labelled as Reason **R**
Assertion A: Electromagnets are made of soft iron.
Reason R: Soft iron has high permeability and low retentivity.
In the light of above, statements, choose the most appropriate answer from the options given below.
JEE MAIN 2023 · 8 APR · SHIFT 2
(a) Both A and R are correct and R is the correct explanation of A
(b) A is not correct but R is correct
(c) A is correct but R is not correct
(d) Both A and R are correct but R is NOT the correct explanation of A

111. The soft-iron is a suitable material for making an electromagnet. This is because soft-iron has
JEE MAIN 2022 · 24 JUN · SHIFT 2
(a) low coercivity and high retentivity.
(b) low coercivity and low permeability.
(c) high permeability and low retentivity.
(d) high permeability and high retentivity.

112. The materials suitable for making electromagnets should have
AIEEE 2004
(a) high retentivity and low coercivity
(b) low retentivity and low coercivity
(c) high retentivity and high coercivity
(d) low retentivity and high coercivity

113. Magnetic materials used for making permanent magnets (P) and magnets in a transformer (T) have different properties of the following, which property best matches for the type of magnet required?
JEE MAIN 2020 · 2 SEP · SHIFT 1 *(Not in current JEE/NEET syllabus)*
(a) T: Large retentivity, small coercivity
(b) P: Large retentivity, large coercivity
(c) P: Small retentivity, large coercivity
(d) T: Large retentivity, large coercivity

◆ Magnetic shielding 3 Qs

114. To protect the instrument from magnetic field, it is completely surrounded by
MHT CET 2025 · 25 APR · SHIFT 2
(a) soft ferromagnetic substance.
(b) diamagnetic substance only.
(c) paramagnetic substance only.
(d) both diamagnetic and paramagnetic substances.

115. Magnetic shielding is done by surrounding the instrument to be protected from magnetic field by
MHT CET 2023 · 13 MAY · SHIFT 2
(a) soft ferromagnetic substance soft iron.
(b) diamagnetic substance fine copper gauge.
(c) paramagnetic substance aluminium.
(d) paramagnetic material tantalum.

116. For protecting a sensitive equipment from the external magnetic field, it should be
AIPMT 1998
(a) placed inside an aluminium can
(b) placed inside an iron can
(c) wrapped with insulation around it when passing current through it
(d) surrounded with fine copper sheet

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ANSWER KEY

Shaded by level: **Easy**

01 Bar Magnet & Magnetic Moment

1. (a)	2. (d)	3. (c)	4. (d)	5. (d)	6. (c)	7. (d)	8. (d)		

02 Magnetisation: B, H, M, χ & μ

9. (a)	10. (b)	11. (d)	12. (d)	13. (c)	14. (c)	15. (b)	16. (c)	17. (b)	18. (d)
19. (c)	20. (a)	21. (a)	22. (c)	23. (d)	24. (c)	25. (b)	26. (c)	27. (a)	28. (c)
29. (d)	30. (a)	31. (c)	32. (b)	33. (a)	34. (b)	35. (d)	36. (c)	37. (c)	38. (a)
39. 2	40. 22								

03 Field of a Magnet & Magnet in a Uniform Field

41. (a)	42. (a)	43. (b)	44. (c)	45. (d)	46. (a)	47. (b)	48. (b)	49. (b)	50. (c)
51. (d)	52. (a)								

04 Earth's Magnetism

53. (c)	54. (b)	55. (b)	56. (d)	57. (a)	58. (c)	59. (b)			

05 Vibration Magnetometer

60. (c)	61. (a)								

06 Magnetic Materials & Curie Law

62. (b)	63. (d)	64. (c)	65. (b)	66. (b)	67. (b)	68. (d)	69. (a)	70. (c)	71. (a)
72. (d)	73. (d)	74. (a)	75. (a)	76. (b)	77. (b)	78. (a)	79. (a)	80. (b)	81. (b)
82. (b)	83. (b)	84. (b)	85. (a)	86. (b)	87. (c)	88. (c)	89. (b)	90. (a)	91. (b)
92. (a)	93. (c)	94. (d)	95. (c)	96. (a)	97. (a)	98. (a)			

07 Hysteresis, Soft Iron vs Steel & Shielding

99. (c)	100. (a)	101. (b)	102. (a)	103. (b)	104. (c)	105. 10	106. 6	107. (d)	108. (b)
109. (c)	110. (a)	111. (c)	112. (b)	113. (b)	114. (a)	115. (a)	116. (b)		

Note: *"Bonus" = no option is correct as the question is printed (dropped in the official key). Numerical questions show the numerical answer.*

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