

JEE MAIN MAGNETISM AND MATTER — PYQS

Max. Marks: 64

Questions: 16

Section A (MCQ) — 10 questions

- Q.1** 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 (Online) 4th April Evening Shift]

- (1) $\frac{25}{\pi}$ (2) $\frac{1}{16\pi}$ (3) $\frac{1}{\pi}$ (4) $\frac{1}{4\pi}$

Scan or tap for the full solution



- Q.2** Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Consider a ferromagnetic material :

Assertion (A): The individual atoms in a ferromagnetic material possess a magnetic dipole moment and interact with one another in such a way that they spontaneously align themselves forming domains.

Reason (R): At high enough temperature, the domain structure of ferromagnetic material disintegrates. Thus, magnetization will disappear at high enough temperature known as Curie temperature.

In the light of the above statements, choose the correct answer from the options given below :

[JEE Main 2026 (Online) 23rd January Morning Shift]

- (1) (A) is true but (R) is false
(2) Both (A) and (R) are true and (R) is the correct explanation of (A)
(3) (A) is false but (R) is true
(4) Both (A) and (R) are true but (R) is not the correct explanation of (A)

Scan or tap for the full solution



- Q.3** 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 (Online) 7th April Morning Shift]

- (1) $\frac{5}{3} \times 10^{-5}\%$ (2) $\frac{5}{6} \times 10^{-4}\%$

$$(3) \frac{5}{6} \times 10^{-5}\%$$

$$(4) \frac{6}{5} \times 10^{-3}\%$$

Scan or tap for the full solution



- Q.4** 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 (Online) 7th April Evening Shift]

- (1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
(2) (A) is not correct but (R) is correct
(3) (A) is correct but (R) is not correct
(4) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

Scan or tap for the full solution



- Q.5** A magnetic dipole experiences a torque of $80\sqrt{3}$ Nm when placed in uniform magnetic field in such a way that dipole moment makes angle of 60° with magnetic field. The potential energy of the dipole is:

[JEE Main 2025 (Online) 3rd April Evening Shift]

- (1) $-40\sqrt{3}$ J (2) -80 J
(3) 80 J (4) -60 J

Solution



- Q.6** 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 (Online) 2nd April Morning Shift]

- (1) $\chi = \frac{\mu}{\mu_0} - 1$ (2) $\chi = \frac{\mu_r}{\mu_0} + 1$
(3) $\chi = \mu_r + 1$ (4) $\chi = 1 - \frac{\mu}{\mu_0}$

Scan or tap for the full solution



- Q.7** 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:

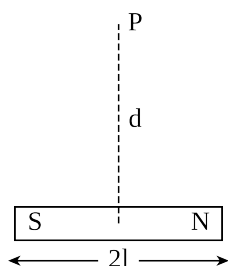
[JEE Main 2025 (Online) 29th January Evening Shift]

- (1) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)
 (2) (A)-(III), (B)-(II), (C)-(I), (D)-(IV)
 (3) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)
 (4) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

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Q.8



A bar magnet has total length $2l = 20$ units and the field point P is at a distance $d = 10$ units from the centre of the magnet. If the relative uncertainty of length measurement is 1%, then uncertainty of the magnetic field at point P is :

[JEE Main 2025 (Online) 28th January Evening Shift]

- (1) 10% (2) 5% (3) 3% (4) 4%

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Q.9 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 (Online) 8th April Morning Shift]

- (1) A, B, C Only (2) A, C Only
 (3) A, B, C, D (4) B, D Only

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

[JEE Main 2024 (Online) 4th April Evening Shift]

(1) $4 \times 10^{-2} \text{ J}$

(2) $16 \times 10^{-2} \text{ J}$

(3) $8 \times 10^{-2} \text{ J}$

(4) Zero

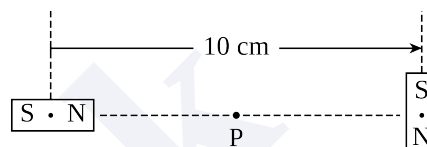
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Section B (Numerical) — 6 questions

Q.11 Two identical small bar magnets each of dipole moment $3\sqrt{5} \text{ J/T}$ are placed at a center to center separation of 10 cm, with their axes perpendicular to each other as shown in figure. The value of magnetic field at the point P midway between the magnets is $\alpha \times 10^{-3} \text{ T}$. The value of α is _____.
 ($\mu_0 = 4\pi \times 10^{-7} \text{ Tm/A}$)

[JEE Main 2026 (Online) 4th April Evening Shift]



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Q.12 A short bar magnet placed with its axis at 30° with an external field of 800 Gauss, experiences a torque of 0.016 N m. The work done in moving it from most stable to most unstable position is $\alpha \times 10^{-3} \text{ J}$. The value of α is _____.

[JEE Main 2026 (Online) 24th January Morning Shift]

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Q.13 A straight magnetic strip has a magnetic moment of 44 Am^2 . If the strip is bent in a semicircular shape, its magnetic moment will be _____ Am^2 .

(given $\pi = \frac{22}{7}$)

[JEE Main 2024 (Online) 9th April Evening Shift]

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Q.14 The coercivity of a magnet is $5 \times 10^3 \text{ A/m}$. 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 (Online) 8th April Evening Shift]

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- Q.15** A circular coil having 200 turns, $2.5 \times 10^{-4} \text{ m}^2$ area and carrying $100 \mu\text{A}$ current is placed in a uniform magnetic field of 1 T. Initially the magnetic dipole moment ($\vec{M}$) was directed along $\vec{B}$. Amount of work, required to rotate the coil through 90° from its initial orientation such that $\vec{M}$ becomes perpendicular to $\vec{B}$, is _____ μJ .

[JEE Main 2024 (Online) 6th April Morning Shift]

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- Q.16** The magnetic potential due to a magnetic dipole at a point on its axis situated at a distance of 20 cm from its center is $1.5 \times 10^{-5} \text{ T m}$. The magnetic moment of the dipole is _____ A m^2 .

(Given : $\frac{\mu_0}{4\pi} = 10^{-7} \text{ T m A}^{-1}$)

[JEE Main 2024 (Online) 29th January Morning Shift]

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**ANSWER KEY****Section A (MCQ) — 10 questions**

Ques.	1	2	3	4	5	6	7
Ans.	2	4	4	1	2	1	1
Ques.	8	9	10				
Ans.	3, 4	2	3				

Section B (Numerical) — 6 questions

Ques.	11	12	13	14	15	16					
Ans.	12	64	28	10	5	6					