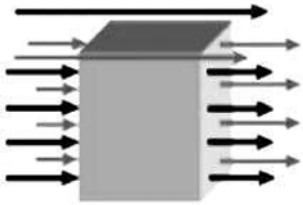
Ultimate KCET Crash Course 2026

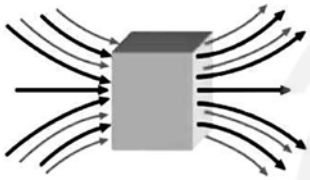
PHYSICS

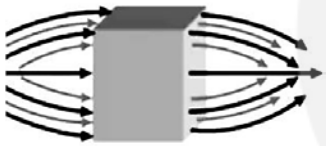
Magnetism and Matter

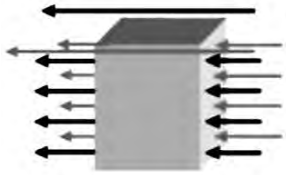
DPP - 01

Q1 A uniform magnetic field, parallel to the plane of the paper existed in space initially directed from left to right. When a bar of soft iron is placed in the field parallel to it, the lines of force passing through it will be represented by

(A) 

(B) 

(C) 

(D) 

Q2 Gauss's law in magnetism ensures that:

(A) Magnetic monopoles do not exist

(B) Magnetic field lines form closed loops

(C) Magnetic field is conservative

(D) Both (A) And (B)

Q3 Which of the following is **not** correct about relative magnetic permeability (μ_r) ?

(A) It is a dimensionless pure ratio.

(B) For vacuum medium its value is one.

(C) For ferromagnetic materials $\mu_r >> 1$

(D) For paramagnetic materials $\mu_r < 1$.

Q4 A paramagnetic substance of susceptibility 3×10^{-4} is placed in a magnetic intensity of 4×10^{-4} Am^{-1}. Then the intensity of magnetization (in the units of $A \times m^{-1}$)

(A) 1.33×10^{8}

(B) 0.75×10^{-8}

(C) 12×10^{-8}

(D) 14×10^{-8}

Q5 Relative permeability of iron is 5500 , then its magnetic susceptibility will be:

(A) 5500×10^{7}

(B) 5500×10^{-7}

(C) 5501

(D) 5499

Q6 A bar magnet is hung by a thin cotton thread in a uniform horizontal magnetic field and is in equilibrium state. The energy required to rotate it by 60° is W. Now the torque required to keep the magnet in this new position is

(A) $\frac{\sqrt{3}}{2}\mathrm{W}$ (B) $\frac{2}{\sqrt{3}}\mathrm{W}$

(C) $\frac{\mathrm{W}}{\sqrt{3}}$ (D) $\sqrt{3}\,\mathrm{W}$

Q7 A diamagnetic substance is brought near the north or south pole of a bar magnet. It will be :

(A) Repelled by both the poles

(B) Attracted by both 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.

Q8 The material of permanent magnet has

(A) High retentivity, low coercivity

(B) Low retentivity, high coercivity

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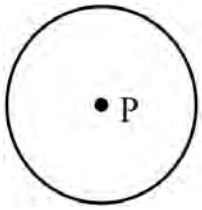
(C) Low retentivity, low coercivity

(D) High retentivity, high coercivity

Q9 A perfectly diamagnetic sphere has a small spherical cavity at its centre, which is filled with a paramagnetic substance. The whole system is placed in a uniform magnetic field $\vec{B}$. Then the field inside the paramagnetic substance is



(A) Much large than $|\vec{B}|$ and parallel to $\vec{B}$
(B) $\vec{B}$
(C) Much large than $|\vec{B}|$ but opposite to $\vec{B}$
(D) zero

Q10 A bar magnet of pole strength 10Am is cut into two equal parts breathwise. The strength of each magnet is

(A) 5Am (B) 10Am
(C) 15Am (D) 20Am

Q11 A closed surface S encloses a magnetic dipole of magnetic moment $2\mathrm{ml}$. The magnetic flux emerging from the surface is

(A) $\mu_0 m$
(B) 0
(C) $2\mu_0 m$
(D) $\frac{2m}{\mu_0}$

Q12 **A permanent magnet**
a. attracts all substances.
b. attracts only magnetic substances.
c. attracts magnetic substances and repels all non-magnetic substances.
d. attracts non-magnetic substances and repels magnetic substances.
(A) **Option (d)**
(B) **Option (a)**
(C) **Option (b)**
(D) **Option (c)**

Q13 **A permanent magnet can be made from which one of the following substances?**
(A) **Paramagnetic**
(B) **Electro magnetic**
(C) **Ferromagnetic**
(D) **Diamagnetic**

Q14 A frog can be levitated in a magnetic field produced by a current in a vertical solenoid placed below the frog. This is possible because the body of the frog behaves as :

(A) Paramagnetic
(B) Diamagnetic

(C) Ferromagnetic
(D) Anti-ferromagnetic

Q15 The magnetism of atomic magnet is due to -

(A) only spin motion of electrons

(B) only orbital motion of electrons

(C) both spin and orbital motion of electrons

(D) the motion of protons.

Q16 Which of the following properties is 'False' for a bar magnet ?
(A) Its poles cannot be separated.
(B) It points in North-South direction when suspended.
(C) Its like poles repel and unlike poles attract.
(D) It doesn't produce magnetic field

Q17 Soft iron is used to make the core of transformer, because of its :
(A) low coercivity and low retentivity

(B) low coercivity and high retentivity

(C) high coercivity and high retentivity

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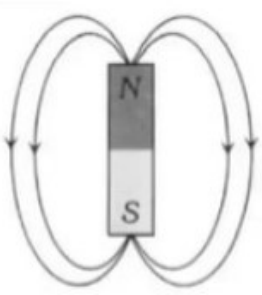
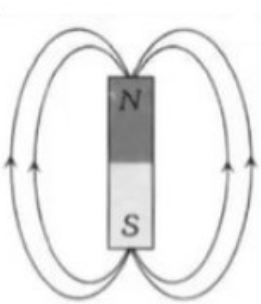
(D) high coercivity and low retentivity

Q18 The magnetic field lines due to a bar magnet are correctly shown in

(A)



(B)



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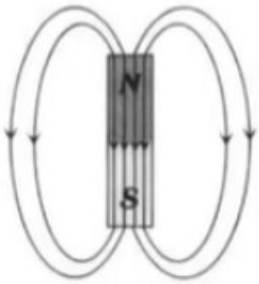
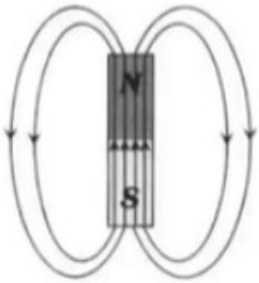


(D)

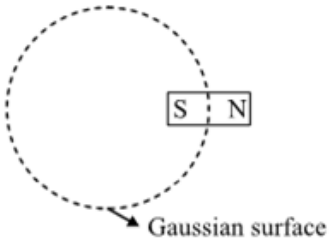


Q19 A bar magnet is held perpendicular to a uniform magnetic field. If the couple acting on the magnet is to be halved by rotating it, then the angle by which it is to be rotated is

(A) 30° (B) 45°

(C) 60° (D) 90°

Q20 An imaginary spherical Gaussian surface passes through a bar magnet as shown below. The half part of bar magnet is inside the Gaussian surface and the other half is outside. Choose the **correct** statement:



(A) There is a net magnetic flux going out of the Gaussian surface.

(B) The net magnetic flux through the Gaussian surface is zero.

(C) There is a net magnetic flux coming inside the Gaussian surface.

(D) Net magnetic flux may be going out or coming inside depending on where the bar magnet is placed on the Gaussian surface.

Q21 The work done in turning a magnet of magnetic moment M by an angle of 90 deg from the meridian is n times the corresponding work done to turn it through an angle of 60°

(A) n = 1/2 (B) n = 2

(C) n = 1/4 (D) n = 1

Q22 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.

(A) Statement I is correct but Statement II is incorrect.

(B) Statement I is incorrect but Statement II is correct.

(C) Both Statement I and Statement II are correct.

(D) Both Statement I and Statement II are incorrect.

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Q23 A diamagnetic material in a magnetic field moves;

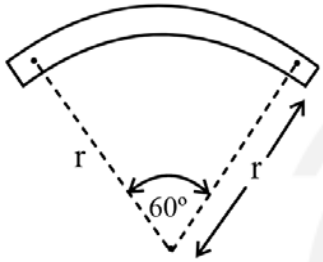
(A) perpendicular to the field.

(B) from stronger to the weaker parts of the field.

(C) from weaker to the stronger parts of the field.

(D) no where, it remains at rest.

Q24 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:



(A) $\frac{2}{\pi}M$ (B) $\frac{M}{2}$
(C) M (D) $\frac{3}{\pi}M$

Q25 In a permanent magnet at room temperature
(A) Magnetic moment of each molecule is zero
(B) The individual molecules have non-zero magnetic moment which are all perfectly aligned
(C) Domains are partially aligned
(D) Domains are all perfectly aligned

Q26 A magnet of magnetic moment 2 J/T is aligned in the direction of magnetic field of 0.1 T. What is the net work done to bring the magnet normal to the magnetic field?
(A) 0.1 J
(B) 0.2 J
(C) 1 J
(D) 2 J

Q27 **Assertion (A):** For making permanent magnets, steel is preferred over soft iron.
Reason (R): As retentivity of steel is smaller.
(A) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).
(C) Assertion (A) is true and Reason (R) is false.
(D) Assertion (A) is false and Reason (R) is true

Q28 Select the wrongly quantity and unit pair.
(A) Pole strength - (A m)
(B) Magnetic susceptibility number - (dimensionless)
(C) Intensity of magnetisation - (Am^{-1})
(D) Magnetic permeability - (Henry m)

Q29 The lines of force due to earth's horizontal magnetic field are:-
(A) parallel and straight
(B) concentric circles
(C) elliptical
(D) curved lines

Q30 Amagnetised steel wire 31.4 cm long has pole strength of 0.2 Am. It is then bent in the form of a semicircle. What is the magnetic moment of the semicircle?
(A) 0.04 Am^2 (B) 0.05 Am^2
(C) 0.06 Am^2 (D) 0.07 Am^2

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Answer Key

Q1	(B)	Q16	(D)
Q2	(D)	Q17	(A)
Q3	(D)	Q18	(D)
Q4	(C)	Q19	(C)
Q5	(D)	Q20	(B)
Q6	(D)	Q21	(B)
Q7	(A)	Q22	(C)
Q8	(D)	Q23	(B)
Q9	(D)	Q24	(D)
Q10	(B)	Q25	(D)
Q11	(B)	Q26	(B)
Q12	(C)	Q27	(C)
Q13	(C)	Q28	(D)
Q14	(B)	Q29	(D)
Q15	(C)	Q30	(A)

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

Permeability of soft iron is maximum, so maximum lines of force tries to pass through the soft iron.

Video Solution:

Q2 Text Solution:

Magnetic flux linked to a Gaussian surface inclosing a magnet is always zero.

no. of field lines entering the surface is same as field lines leaving the surface.

Video Solution:

Q3 Text Solution:

Theory Based

Video Solution:

Q4 Text Solution:

$$\text{Susceptibility } (\chi) = \frac{\text{intensity of magnetisation } (I)}{\text{magnetic field } (B)}$$

$$\text{or } I = \chi B$$

$$\therefore I = 3 \times 10^{-4} \times 4 \times 10^{-4}$$

$$\text{or } I = 12 \times 10^{-8}\ \text{Am}^{-1}$$

Video Solution:

Q5 Video Solution:

Q6 Text Solution:

$$W = MB[\cos\theta_1 - \cos\theta_2]\theta_1$$

$$= 0\left(becaise\ initially\ it\ is\ in\ equilibrium\right)$$

$$W = MB[\cos 0^\circ - \cos 60^\circ]$$

$$\Rightarrow W = MB\left[1 - \tfrac{1}{2}\right] = \tfrac{MB}{2} \Rightarrow MB = 2W$$

$$\vec{\tau} = \vec{M} \times \vec{B} \Rightarrow \tau = MB\sin 60^\circ$$

$$\tau = MB\tfrac{\sqrt{3}}{2} = 2W \times \tfrac{\sqrt{3}}{2} = \sqrt{3}\ \text{W}$$

(because initially it is in equilibrium)

Video Solution:

Q7 Video Solution:

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Q8 Video Solution:

Q9 Text Solution:

A perfect diamagnetic substance will completely expel the magnetic field. Therefore, there will be no magnetic field inside the cavity of sphere. Hence the paramagnetic substance kept inside the cavity will experience no force.

Video Solution:

Q10 Text Solution:

Cutting the breath wise the bar magnet pole strength will become half.

Video Solution:

Q11 Text Solution:

(B)

According to Gauss's law of magnetism, the net magnetic flux through any closed surface is always zero, i.e.,

$\oint B \cdot ds = 0$

Therefore the magnetic flux emerging from the closed surface enclosing a magnetic dipole of magnetic moment $2\ \mathrm{ml}$ is zero.

Hence option(B) is the correct answer.

Video Solution:

Q12 Text Solution:

Option (c)

Attracts only magnetic substances

Video Solution:

Q13 Text Solution:

Ferromagnetic

Video Solution:

Q14 Text Solution:

To levitate a body, a force must be applied on it which at least balances the body's weight which will always pull the frog down, so force must act in the upward direction. Thus, the frog is repelled by the magnetic field.

Diamagnetic substances are only substances which are repelled by a magnetic field. This shows that the body of the frog behaves like diamagnetic substance.

Video Solution:

Q15 **Video Solution:**

Q16 **Video Solution:**

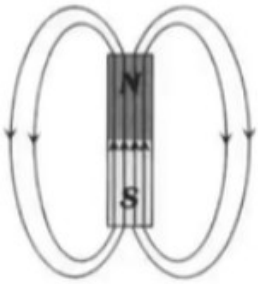
Q17 **Text Solution:**

Low coercivity and low retentivity

Video Solution:

Q18 **Text Solution:**

Outside the magnet the direction of magnetic field lines is from its north pole to its south pole and inside the magnet the direction of magnetic field lines is from its south pole to its north pole.



Video Solution:

Q19 **Text Solution:**

$\tau = MB \sin\theta$

$\theta_1 = 0^\circ \Rightarrow \tau = MB$

$if\ \tau' = \frac{\tau}{2},\ we\ get\ \theta_2 = 30^\circ$

$\therefore \Delta\theta = 90^\circ - 30^\circ = 60^\circ$

Video Solution:

Q20 **Text Solution:**

Net magnetic flux through any closed Gaussian surface is zero as magnetic monopoles cannot exist.

Video Solution:

Q21 **Text Solution:**

Work done, $W = MB(\cos\theta_1 - \cos\theta_2)$

For roatating 60°

$$W_2 = MB(\cos 0^\circ - \cos 60^\circ)$$
$$= MB(1 - 1/2)$$
$$= \frac{MB}{2}$$

For rotating 90°

$$W_1 = MB(\cos 0^\circ - \cos 90^\circ) \Rightarrow W_1 = MB$$

Given

$W_1 = nW_2 \qquad MB = n \times \frac{MB}{2} \quad n = 2$

Video Solution:

Q22 **Text Solution:**

Statement-I

For diamagnetic substances, –1 ≤ χ < 0, where χ is the magnetic susceptibility.

- Magnetic susceptibility (χ) is negative for diamagnetic substances.
- Diamagnetic materials are slightly repelled by magnetic fields.
- The value of χ is small and negative, typically between –1 and 0.

Statement-II

Diamagnetic *substances, when placed in an external magnetic field, tend to move from stronger to weaker part of the field.*

- Diamagnetic materials do not retain magnetism and are repelled by magnetic fields.
- Hence, they tend to move away from regions of stronger magnetic field to weaker regions.

So, Both Statement–I and Statement–II are correct.

Video Solution:

Q23 **Text Solution:**

Diamagnetic material in a magnetic field moves from stronger to the weaker parts of the field

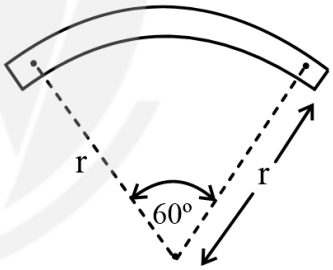
Video Solution:

Q24 **Text Solution:**

(4)

Let *m* be strength of each pole of bar magnet of length *l*. Then M = *m* × *l* --- (i)

When the bar magnet is bent in the from of an arc as shown in the figure



$l = \frac{\pi}{3} \times r = \frac{\pi r}{3}$ *or* $r = \frac{3l}{\pi}$

New magnetic dipole moment

M' = m × 2r sin 30°

$= m \times 2 \times \frac{3l}{\pi} \times \frac{1}{2} = \frac{3ml}{\pi} = \frac{3M}{\pi}$

Video Solution:

Q25 **Text Solution:**

Domains are all perfectly aligned

Video Solution:

Q26 **Text Solution:**

Work done in rotating the magnet in uniform magnetic field is given by

$W = MB(\cos\theta_1 - \cos\theta_2)$

Here, $\theta_1 = 0^\circ, \theta_2 = 90^\circ$

$\therefore W = 2 \times 0.1(\cos 0^\circ - \cos 90^\circ)$

$= 2 \times 0.1(1.0) = 0.2\ J$

Video Solution:

Q27 **Video Solution:**

Q28 **Text Solution:**

Magnetic permeability (henry m^{-1})

Video Solution:

Q29 **Text Solution:**

The imaginary lines along which the north magnetic pole will move are called magnetic field lines.

The earth behaves like a bar magnet with the southern and northern poles acting as the poles of the magnet.

Therefore , the lines of force of Earth's magnetic field are curved in nature.

Video Solution:

Q30 **Text Solution:**

When the wire is bent in the form of a semicircle of radius r, then

$L = \pi r = 3.14r$

$r = \frac{L}{3.14} = \frac{31.4}{3.14} = 10cm$

$\text{Distance between the two ends of wire}$

$2\text{r} = 20\text{cm} = 0.2\text{m}$

$\text{M} = \text{m} \times 2\text{r} = 0.2 \times 0.2 \Rightarrow M = 0.04Am^2$

Video Solution: