DPP
DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : PHYSICS
DPP No. : 1

Topic :- MAGNETISM AND MATTER

1 **(a)**

$X = C \times \frac{1}{T} = \frac{0.4}{7 \times 10^{-3}} = 57K$

2 **(b)**

Repelled due to induction of similar poles

3 **(a)**

Pole strength depends on material of magnet, state of magnetization and cross-sectional area. As $m \propto A$, so if A becomes half, pole strength gets half.

4 **(c)**

$c = \frac{1}{2\pi}\sqrt{\frac{MB_H}{I}} \Rightarrow v \propto \sqrt{M}$

$\Rightarrow \frac{v_A}{v_B} = \sqrt{\frac{M_A}{M_B}} \Rightarrow \frac{2}{1} = \sqrt{\frac{M_A}{M_B}} \Rightarrow M_A = 4\,M_B$

5 **(d)**

Inside bar magnet, lines of force are from south to north.

7 **(b)**

$\tau = MH\sin\theta = MH\sin 30° = \frac{MH}{2}$

8 **(a)**

Magnetic moment, $M = iA \Rightarrow i = \frac{M}{A}$

9 **(a)**

If the temperature of a ferromagnetic material is raised above a certain critical value, called the Curie temperature, the exchange coupling ceases to be effective. Most such materials then become simply paramagnetic; that is, the dipoles still tend to align with an external field but much more weakly, and thermal agitation can now more easily disrupt the alignment.

10 **(c)**

When axes are in the same line,

$F = \frac{\mu_0}{4\pi}\frac{6M_1M_2}{r^4}$ $ie, F \propto \frac{1}{r^4}$

When, r becomes thrice, F becomes $\frac{1}{(3)^4}$ time

$ie, \frac{1}{81}$ time. Therefore, $F' = \frac{8.1}{81} = 0.1$ N

11 **(a)**

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

When the magnet is rotated from 0° to 60°, then work done is $0.8\,J$

$0.8 = MB(\cos 0° - \cos 60°) = \frac{MB}{2}$

$\Rightarrow MB = 1.6\,N - m$

In order to rotate the magnet through an angle of 30°, $i.e.$, from 60° to 90°, the work done is

$W' = MB(\cos 60° - \cos 90°) = MB\left(\frac{1}{2} - 0\right)$

$= \frac{MB}{2} = \frac{1.6}{2} = 0.8J = 0.8 \times 10^7\ erg$

13 **(a)**

$M = mL = 4 \times 10 \times 10^{-2} = 0.4\ A \times m^2$

15 **(c)**

Time period of magnet in vibration magnetometer

$T = 2\pi\sqrt{\frac{I}{MH}}$

First case $T_1 = 2\pi\sqrt{\frac{I_1 + I_2}{M'H}}$

Where M= resultant magnetic moment of two magnets

Here, two identical magnets are placed perpendicular to each other.

$\therefore I_1 = I_2 = I$(Let)

And $M' = \sqrt{M^2 + M^2} = M\sqrt{2}$

$\therefore \quad T_1 = 2\pi\sqrt{\frac{2I}{\sqrt{2}MH}}$

$2^{5/4} = 2\pi\sqrt{\frac{2I}{\sqrt{2}\,MH}}$ ... (i)

When one magnet is removed, then time period

$T_2 = 2\pi\sqrt{\frac{I}{MH}}$ ... (ii)

Dividing Eq. (i) by Eq.(ii)

$\frac{2^{5/4}}{T_2} = \sqrt{\frac{2}{\sqrt{2}}}$

$\frac{2^{5/4}}{T_2} = 2^{1/4}$

$T_2 = \frac{2^{5/4}}{2^{1/4}} = 2\text{s}$

16 **(d)**

Copper is a diamagnetic material, therefore its rod aligh itself where magnetic field is weaker and perpendicular to the direction of magnetic field there.

17 **(d)**

$F = \frac{\mu_0}{4\pi}.\frac{m_1 m_2}{r^2}$ ... (i)

When pole strength of each pole become double.

$\therefore\ F' = \frac{\mu_0}{4\pi}.\frac{(2m_1)(2m_2)}{(2r)^2} = F$

19 **(b)**

The coercivity of a substance is a measure of the reverse magnetizing field required to destroy the residual magnetism of the substance.

20 **(a)**

On equatorial line, magnetic field due to magnet varies inversely as cube of the distance, therefore,

$\frac{B_1}{B_2} = \left(\frac{3x}{x}\right)^3 = 27 : 1$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	A	B	A	C	D	D	B	A	A	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	A	B	A	A	C	D	D	D	B	A