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

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

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

When one magnet is removed, then time period

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

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)**

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

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