DPP
DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : PHYSICS
DPP No. : 10

Topic :- MAGNETISM AND MATTER

1 **(a)**

Torque, $\tau = MB\sin\theta$

$\Rightarrow \tau = (mL)B\sin\theta$

$\Rightarrow 25\times10^{-6} = (m\times5\times10^{-2})\times510^{-2} \times \sin 30°)$

$\Rightarrow m = 2\times10^{-2}\ \mathrm{A-m}$

2 **(c)**

Dipole is the ultimate individual unit of magnetism in any magnet.

4 **(b)**

Current, $I = B_H \times \frac{2r\ \tan\theta}{n\mu_0}$

$= 4\times10^{-5}\times\frac{2\times0.1\times\tan60°}{10\times4\pi\times10^{-7}} = 1.1\ \text{Å}$

5 **(a)**

Along the axis of magnet $B_a = \frac{2M}{X^3} = 200\ gauss$

$\Rightarrow B_a = \frac{M}{X^3} = 100\ gauss$

6 **(c)**

Diamagnetic materials have negative susceptibility. Thus, (c) is wrongly stated.

7 **(c)**

For paramagnetic materials, the magnetic susceptibility gives information on the molecular dipole moment and hence on the electronic structure of the molecules in the material. The paramagnetic contribution to the molar magnetic susceptibility of a material, X is related to the molecular magnetic moment M by the Curie relation

$X = constant \times \frac{M}{T} \Longrightarrow X \propto \frac{1}{T}$

8 **(d)**

$B_1 = \frac{2M}{x^3}$ and $B_2 = \frac{M}{y^3}$

As $B_1 = B_2$

Hence $\frac{2M}{x^3} = \frac{M}{y^3}$ or $\frac{x^3}{y^3} = 2$ or $\frac{x}{y} = 2^{1/3}$

9 **(b)**

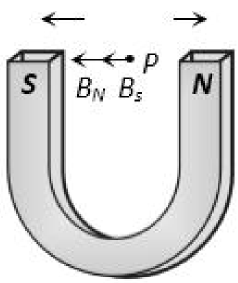
$B = \frac{m}{d^2}$ in C.G.S. system

12 **(c)**

Net magnetic field at mid point P, $B = B_N + B_S$

where B_N = magnetic field due to N-pole

B_S = magnetic field due to S-pole



$B_N = B_S = \frac{\mu_0}{4\pi}\frac{m}{r^2}$

$= 10^{-7} \times \frac{0.01}{\left(\frac{0.1}{2}\right)^2} = 4 \times 10^{-7} T$

$\therefore B_{net} = 8 \times 10^{-7} T$

13 **(c)**

Here, $2l = 20$ cm $\Rightarrow l = 10$ cm, $d = 40$ cm.

As neutral point, $H = B = \frac{\mu_0}{4\pi}\frac{2\,Md}{(d^2-l^2)^2}$

$3.2 \times 10^{-5} = \frac{10^{-7} \times 2M(0.4)}{15 \times 15 \times 10^{-4}}$

$\therefore M = \frac{3.2 \times 15 \times 15 \times 10^{-4} \times 10^{-5}}{0.8 \times 10^{-7}} = 9$

$m = \frac{M}{2l} = \frac{9}{0.2} = 45$ A-m

14 **(b)**

When magnet are placed perpendicular to each other then,

Resultant magnetic moment

$$M' = \sqrt{M_1^2 + M_2^2}$$

Here, $M_1 = M_2 = M$

So, $M' = M\sqrt{2} = ml\sqrt{2}$

17 **(c)**

At neutral point

$$\begin{vmatrix}\text{Magnetic field due} \\ \text{to magnet}\end{vmatrix} = \begin{vmatrix}\text{Magnetic field due} \\ \text{to earth}\end{vmatrix}$$

$$\frac{\mu_0}{4\pi}\cdot\frac{2M}{d^3} = 5 \times 10^{-5} \Rightarrow 10^{-7} \times \frac{2 \times 6.75}{d^3} = 5 \times 10^{-5}$$

$\Rightarrow d = 0.3\ m = 30\ cm$

19 **(c)**

When two identical bar magnets are held perpendicular to each other.

$M_1 = \sqrt{M^2 + M^2} = M\sqrt{2}, I_1 = I$

$T_1 = 2^{5/4}\,\mathrm{s}, T_2 = ?$

$M_2 = M$ (as one magnet is removed)

$I_2 = I_1/2$

$$\frac{T_2}{T_1} = \sqrt{\frac{I_2}{M_2}\frac{M_1}{I_1}} = \sqrt{\frac{1}{2}\cdot\frac{M\sqrt{2}}{M}} = \left(\frac{1}{\sqrt{2}}\right)^{1/2}$$

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

$T_2 = T_1 \times \frac{1}{2^{1/4}} = 2^{5/4} \times \frac{1}{2^{1/4}} = 2s$

20 **(b)**

Magnetic intensity on end side-on position is twice than broad side on position

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