DPP
DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : PHYSICS
DPP No. : 8

Topic :- MAGNETISM AND MATTER

2 **(c)**

$$\frac{B_2}{B_1}=\frac{n_2^2}{n_1^2}=\frac{10^2}{5^2}=4$$

$B_2=4B_1=4\times 0.3\times 10^{-4}\text{T}=1.2\times 10^{-4}\text{T}$

Increase in field $=B_2-B_1=0.9\times 10^{-4}$ T

3 **(a)**

Resultant force acting on a diamagnetic material in a magnetic field is in direction from stronger to the weaker part of the magnetic field.

5 **(d)**

As $T=2\pi\sqrt{\frac{I}{MH}}$ $\therefore 2=2\pi\sqrt{\frac{I}{MH}}$ ...(i)

When an external magnet is brought near and parallel to H, and the time period reduces to 1 s, net field must be $(F+H)$.

$\therefore 1=2\pi\sqrt{\frac{I}{M(F+H)}}$ ...(ii)

Divided Eq. (i) by Eq. (ii),

$$\frac{1}{2}=\sqrt{\frac{F+H}{H}}=\sqrt{\frac{F}{H}+1}$$

$$\frac{F}{H}+1=4$$

$$\frac{F}{H}=4-1=3$$

6 **(b)**

A dia-magnetic liquid moves from stronger parts of magnetic field to weaker parts. Therefore the meniscus of the level of solution will fall.

7 **(a)**

Plane of coil is having angle θ with the magnetic field

$\therefore \tau=MB\sin(90-\theta)$ or $\tau=niAB\cos\theta$ [As $M=niA$]

8 **(d)**

PQ_6 corresponds to the lowest potential energy among all the configurations shown

9 **(a)**

When space inside the toroid is filled with air,

$B_0 = \mu_0 H$

When filled with tungsten,

$B = \mu H = \mu_0 \mu_r H = \mu_0(1 + \mathcal{X}_m)H$

Percentage increase in magnetic field/ induction

$$= \frac{(B - B_0) \times 100}{B_0} = \frac{\mu_0 \mathcal{X}_m \times 100}{\mu_0 H} = \mathcal{X}_m \times 100$$

$= 6.8 \times 10^{-5} \times 100 = 0.0068\%.$

10 **(b)**

Here, $V = (10 \times 0.5 \times 0.2)\text{cm}^3$

$= 1\text{ cm}^3 = 10^{-6}\text{m}^3$

$H = 0.5 \times 10^4\text{ Am}^{-1}, M = 5\text{ Am}^2, B = ?$

$I = \frac{M}{V} = \frac{5}{10^{-6}} = 5 \times 10^6\text{ Am}$

From $B = \mu_0(I/+H)$

$B = 4\pi \times 10^{-7}(5 \times 10^6 + 0.5 \times 10^4) = 6.28\text{ T}$

11 **(b)**

Ist case: $n = \frac{1}{2\pi}\sqrt{\frac{MB_H}{I}}$

$$\Rightarrow \quad n \propto \sqrt{B_H} \Rightarrow \frac{n_1}{n_2} = \sqrt{\frac{B_H}{B_H + B_{H_1}}}$$

$$\Rightarrow \quad \frac{12}{15} = \sqrt{\frac{B_H}{B_H + B_{H_1}}}$$

$$\Rightarrow B_{H_1} = \frac{9}{16}B_H$$

IInd case:

$$\frac{n_2}{n_3} = \sqrt{\frac{B_H + B_{H_1}}{B_H - B_{H_1}}}$$

$$\Rightarrow \frac{15}{n_3} = \sqrt{\frac{B_H + \frac{9}{16}B_H}{B_H - \frac{9}{16}B_H}}$$

$$\frac{15}{n_3} = \sqrt{\frac{B_H + \frac{9}{16}B_H}{B_H - \frac{9}{16}B_H}}$$

∴ $n_3 = \sqrt{63}$

12 **(c)**

Partially filled inner subshells are responsible for ferro-magnetic behaviour of such substances.

13 **(b)**

Mass becomes 1/4 and length becomes 1/4.

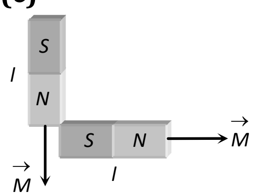
∴ Moment of inertia I becomes $\frac{1}{4}\left(\frac{1}{4}\right)^2 = \frac{1}{64}$, Magnetic moment M becomes 1/4th.

As $T = 2\pi\sqrt{\frac{1}{MH}}$, ∴ T becomes 1/4th.

14 **(b)**

For diamagnetic material, $0 < \mu_r < 1$ and for any material $\varepsilon_r > 1$.

15 **(c)**



$M_{net} = \sqrt{2}M = \sqrt{2}ml$

16 **(b)**

Number of lines of force passing through per unit area normally is intensity of magnetic field, hence option (c) is incorrect. The correct option is (b)

17 **(a)**

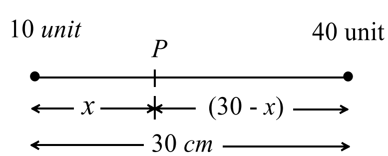
The magnetic field (**B**) due to an isolated pole at a distance r from it is given by

$$B = \frac{\mu_0}{4\pi} \cdot \frac{m}{r^2}$$

Where m pole strength.

18 **(b)**

Suppose magnetic field is zero at point P which lies at a distance x from 10 unit pole. Hence at P



$\frac{\mu_0}{4\pi} \cdot \frac{10}{x^2} = \frac{\mu_0}{4\pi} \cdot \frac{40}{(30-x)^2} \Rightarrow x = 10cm$

So from stronger pole distance is 20 cm

20 **(a)**

Hysteresis loop is studied generally for ferro-magnetics only.

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