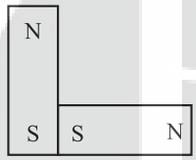
CHAPTER 5

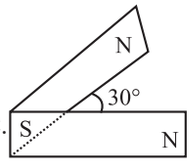
Magnetism and Matter

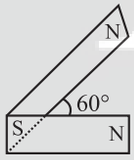
Magnetic Dipole Moment, and Force Between Magnetic Poles

1. Following figures show the arrangement of bar magnets in different configurations. Each magnet has magnetic dipole moment m . Which configuration has highest net magnetic dipole moment? *(2014)*

A. 

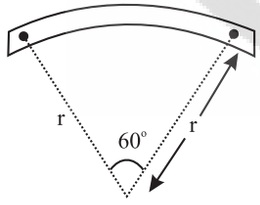
B. 

C. 

D. 

a. A
b. B
c. C
d. D

2. 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: *(2013)*



a. 2M
b. M
c. 3M/π
d. π/2 M

Torque Acting On a Magnetic Dipole and Potential Energy of Dipole in a Magnetic Field

3. A 250 turn rectangular coil of length 2.1 cm and width 1.25 cm carries a current of 85 μA and subjected to a magnetic field of strength 0.85 T. Work done for rotating the coil by 180° against the torque is: *(2017-Delhi)*

a. 4.55 μJ
b. 2.3 μJ
c. 1.15 μJ
d. 9.1 μJ

4. 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: *(2016 - II)*

a. $\frac{\sqrt{3}W}{2}$
b. $\frac{2W}{\sqrt{3}}$
c. $\frac{W}{\sqrt{3}}$
d. $\sqrt{3}W$

Magnetic Elements of Earth

5. At a point A on the earth's surface the angle of dip, $\delta = +25°$. At a point B on the earth's surface the angle of dip, $\delta = -25°$. We can interpret that: **[RC]** *(2019)*

a. A and B are both located in the northern hemisphere.
b. A is located in the southern hemisphere and B is located in the northern hemisphere.
c. A is located in the northern hemisphere and B is located in the southern hemisphere.
d. A and B are both located in the southern hemisphere.

6. If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then the true angle of dip θ is given by: **[RC]** *(2017-Delhi)*

a. $\tan^2\theta = \tan^2\theta_1 + \tan^2\theta_2$
b. $\cot^2\theta = \cot^2\theta_1 - \cot^2\theta_2$
c. $\tan^2\theta = \tan^2\theta_1 - \tan^2\theta_2$
d. $\cot^2\theta = \cot^2\theta_1 + \cot^2\theta_2$

Magnetic Properties of Materials

7. An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m^{-1}. The permeability of the material of the rod is : *(2020)*

($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})

a. 8.0×10^{-5} T m A^{-1}
b. $2.4\pi \times 10^{-5}$ T m A^{-1}
c. $2.4\pi \times 10^{-7}$T m A^{-1}
d. $2.4\pi \times 10^{-4}$ T m A^{-1}

8. A thin diamagnetic rod is placed vertically between the poles of an electromagnet. When the current in the electromagnet is switched on, then the diamagnetic rod is pushed up, out of the horizontal magnetic field. Hence the rod gains gravitational potential energy. The work required to do this comes from: *(2018)*

a. The lattice structure of the material of the rod
b. The magnetic field
c. The current source
d. The induced electric field due to the changing magnetic field

9. The magnetic susceptibility is negative for: *(2016 - I)*

a. Diamagnetic material only
b. Paramagnetic material only
c. Ferromagnetic material only
d. Paramagnetic and ferromagnetic materials

Answer Key

1	2	3	4	5	6	7	8	9
c	c	d	d	c	d	d	c	a