Magnetism

1. If the angular momentum of an electron of mass m is J then the magnitude of the magnetic moment will be

(a) $\frac{eJ}{m}$ (b) $\frac{eJ}{2m}$ (c) $2eJm$ (d) $\frac{2m}{eJ}$

2. Two small bar magnets are placed in a line with like poles facing each other at a certain distance *d* apart. If the length of each magnet is negligible as compared to *d* the force between them will be inversely proportional to

(a) d (b) d^2 (c) $\frac{1}{d^2}$ (d) d^4

3. A paramagnetic gas consists of atoms each with a dipole moment of 1.5×10^{-23} J/*T*. Temperature of the gas is 27°*C* and its number density is 2× 10^{26} m^{-3}. What is the maximum magnetisation of the sample possible when placed in an external field

(a) $1\times10^3\,A/m$ (b) $2\times10^3\,A/m$ (c) $3\times10^3\,A/m$ (d) $4\times10^3\,A/m$

4. The true value of angle of dip at place is 60°, the apparent dip in a plane inclined at an angle of 30° with magnetic meridian is

(a) $\tan^{-1}\frac{1}{2}$ (b) $\tan^{-1}(2)$ (c) $\tan^{-1}\left(\frac{2}{3}\right)$ (d) None of these

5. A dip needle arranged to move freely in the magnetic meridian dips by an angle θ. If the vertical plane in which the needle moves is rotated through an angle α to the magnetic meridian, then the needle will dip by an angle

(a) θ (b) α (c) More than θ (d) Less than θ

6. The materials suitable for making electromagnets should have

(a) High retentivity and low coercivity (b) Low retentivity and low coercivity

(c) High retentivity and high coercivity (d) Low retentivity and high coercivity

7. A vibration magnetometer consists of two identical bar magnets placed one over the other such that they are perpendicular and bisect each other. The time period of oscillation in a horizontal magnetic field is $2^{5/4}$ seconds. One of the magnets is removed and if the other magnet oscillates in the same field, then the time period in seconds is

(a) $2^{1/4}$ (b) $2^{1/2}$ (c) 2 (d) $2^{-1/4}$

8. The period of oscillations of a freely suspended bar magnet in the earth Horizontal field (*H*) is 4*sec*. When another magnet is brought near it, the period of oscillating is reduced to 2*sec*.The field of the second magnet is

(a) $\sqrt{3}H$ (b) $2H$ (c) $3H$ (d) $4H$

9. If a diamagnetic solution is poured into a U-tube and one arm of this U-tube placed between the poles of a strong magnet with the meniscus in a line with the field, then the level of the solution will

(a) Rise (b) Fall (c) Oscillate slowly (d) Remain as such

10. The number of atoms per unit volume in a sample of iron is 9×10^{28} atom/m^3. The magnetic moment of every iron atom is 1.5×10^{28} *A*-m^2. If all the dipoles are aligned in a domain due to ferromagnetic interaction, then the magnetization of an iron rod of length 10 *cm* and area of cross-section 1 cm^2 will be

(a) 1.8×10^6 *A/m* (b) 1.31×10^5 *A/m* (c) 1.35×10^5 *A/m* (d) 1.4×10^3 *A/m*

11. The magnetic lines of force inside a bar magnet

(a) Are form south-pole to north - pole of the magnet (b) Are form north – pole to south – pole of the magnet

(c) Do not exist (d) Depend upon the area of cross–section of the bar magnet

12. A small bar magnet has a magnetic moment 1.2 $A-m^2$. The magnetic field at a distance 0.1 m on its axis will be $(\mu_0=4\pi\times10^{-7}\,T.m/A)$

(a) $1.2\times10^{-4}\,T$ (b) $2.4\times10^{-4}\,T$ (c) $2.4\times10^{4}\,T$ (d) $1.2\times10^{2}\,T$

13. At the north pole of earth

(a) *V*>>*H* (b) *V* = *H* = 0 (c) *V*<< *H* (d) $V\neq0, H=0$

14. At a certain place, the horizontal component B_0 and the vertical component V_0 of the earth's magnetic field are equal in magnitude. The total intensity at the place will be

(a) B_0 (b) B_0^2 (c) $2B_0$ (d) $\sqrt{2}B_0$

15. The length of a magnet is large compared to its width and breadth. The time period of its oscillation in a vibration magnetometer is 2 *sec*. The magnet is cut along its length into three equal parts and these parts are then placed on each other with their like poles together. The time period of this combination will be

(a) $2\sqrt{3}$ *sec* (b) $\frac{2}{3}$ *sec* (c) 2 *sec* (d) $\frac{2}{\sqrt{3}}$ *sec*