

LESSON 1 - Question Bank

[A] Answer the following in short

1. What are magnetic and non-magnetic materials?
2. What is magnetic field?
3. Define magnetic dipole.
4. What is magnetic moment?
5. Explain: magnetic induction.
6. What is magnetic field strength?
7. What is meant by magnetization?
8. Define the term magnetic susceptibility.
9. Define magnetic permeability.
10. What is magnetic field intensity?
11. Define: magnetic flux density
12. What are the different types of magnetic materials?

[B] Answer the following in detail

1. What is meant by permanent dipole moment? Explain the origin of permanent dipole moment in magnetic materials?
2. What is a magnetic material? Distinguish between a hard and soft magnetic material.

[C] Calculate the following examples

(1) A magnetic material has magnetization of 2300 Am^{-1} and produces a flux density of 0.00314 Wbm^{-2} . Calculate the magnetizing force and the relative permeability of the material.

Magnetization $M = 2300 \text{ Am}^{-1}$

Flux density $B = 0.00314 \text{ Wbm}^{-2}$

$\mu_0 = 4\pi \times 10^{-7}$

Magnetizing force $H = \frac{B}{\mu_0} - M = 198.7 Am^{-1}$

Susceptibility $\chi = \frac{M}{H} = \mu_r - 1$

(2) A paramagnetic has a magnetic field intensity of $10^4 Am^{-1}$. If the susceptibility of the material at room temperature is 3.7×10^{-3} . Calculate the magnetization and flux density.

(3) The magnetic field strength of copper is $10^6 Am^{-1}$. If the magnetic susceptibility of copper is -8.7×10^{-5} . Calculate the flux density and magnetization in copper.

(4) A magnetic field of $1800 Am^{-1}$ produces a magnetic flux of $3 \times 10^{-5} \text{weber}$ in an iron bar of cross sectional area $0.2 cm^2$. Calculate permeability.

Magnetic field intensity $H = 1800 Am^{-1}$

Magnetic flux $\varphi = 3 \times 10^{-5} \text{weber}$

Area of cross section $A = 0.2 \times 10^{-4} m^2$

Magnetic flux density $B = \frac{\varphi}{A}$

Permeability $\mu = \frac{B}{H}$

(5) The magnetic field strength of copper is $10^7 Am^{-1}$. If the magnetic susceptibility of copper is -0.5×10^{-5} . Calculate the flux density and magnetization in copper.