



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

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FRESHMAN ENGINEERING DEPARTMENT

Assignment

UNIT III Dielectric and Magnetic materials

1	Explain the electronic polarization and derive the expression for electronic polarizability.
2	Obtain the expression for ionic polarizability.
3	Define dielectric constant and susceptibility. Obtain a relation between dielectric constant and susceptibility.
4	Explain the frequency dependence of polarisation.
5	Deduce the expression for internal electric field in dielectrics.
6	Derive Claussius-Mosotti relation.
7	Define magnetic permeability, susceptibility and obtain a relation between them.
8	Distinguish para, dia and ferro, antiferro and ferri magnetic materials.
9	Illustrate the Hysteresis curve.
10	Classify the magnetic materials based on Hysteresis loop and give the differences between them.
11	Illustrate the Domain theory of ferromagnetism.

Problems

1	A magnetic material has a magnetisation of 3300 A/m and flux density of 0.0044 Wb/m^2 . Estimate the magnetizing force and the relative permeability of the material.
2	Estimate the relative permeability of a ferromagnetic material if a field of strength 220 A/m produces a magnetisation 3300 A/m in it.
3	A paramagnetic material has 10^{38} atoms per m^3 . Its susceptibility at 350K is 2.8×10^{-4} . Evaluate the susceptibility at 300K.
4	Diamagnetic Al_2O_3 is subjected to external magnetic field of 10^5 A/m . Evaluate magnetization and magnetic flux density in Al_2O_3 ($\chi = -5 \times 10^{-5}$).
5	The magnetic field in the interior of a certain solenoid has the value of

	6.5×10^{-4} T when the solenoid is empty. When it is filled with iron, the field becomes 1.4 T. Find the relative permeability.
6	The permittivity of a material is $20 \times 10^{-10} \text{ C}^2/\text{Nm}^2$. Estimate the values of dielectric constant and susceptibility of the material.
7	The susceptibility of a material is 5. Evaluate its dielectric constant and permittivity.
8	The dielectric constant of He gas at NTP is 1.0000695, find its susceptibility.
9	The atomic radius of an atom is 4 Å. Estimate the electronic polarizability of the atom.
10	The dielectric constant of He gas at NTP is 1.0000684. Estimate the electronic polarizability of He atoms if the gas contains 2×10^{25} atoms/ m^3 .