IITE-B.Tech.

Semester-I/II

Subject: Engineering Physics (PH0011)

Unit -1 Assignment

Definitions:

Electric field intensity, Electric flux , Coulomb's law, Polarization, Dielectric constant, Electric Susceptibility, Electric dipole moment, Magnetization, Magnetic susceptibility,permeability, Magnetic flux, Magnetic flux density

Short/Long questions:

1. State and explain Coulomb's law with suitable formula.
2. State and explain Gauss's law.
3. What do you mean by dielectric material? How it behaves in the presence of electric field.
4. Derive the relation between polarisation, dielectric constant and electric susceptibility.
5. Derive the Clausius-Mossotti equation for the non polar dielectric material.
6. What is polarisation in dielectric? Discuss the different types of polarisation with necessary diagram.
7. Mention the major differences between diamagnetic, paramagnetic and ferromagnetic materials.
8. What is ferromagnetic domain? What is the effect of external magnetic field on domains.
9. What do you mean by hysteresis loss? Define and show the retentivity and coercivity on the hysteresis loop diagram.
10. Derive relation between B, H and M.

Numericals: (Also you can practice similar examples as per the given referencebook.)

1. A magnetising field of 1000A/m produces a magnetic flux of $2x10^{-5}$ Weber in a bar of iron of $0.2cm^2$ cross-section. Calculate permeability and susceptibility of the bar.
2. Two parallel plates having equal and opposite charges are separated by a 2cm thick slab that has dielectric constant 3. If the electric field inside is 10^6 V/m, calculate the polarization and displacement vector.
3. A dielectric constant of diamond is 1.43. Calculate permittivity and electric susceptibility of diamond.

4. A solid dielectric is placed in an electric field of 750 Vm -1 and polarization is given by 3.8 $x10^{-8} C/m^2$. Evaluate relative permittivity of material.
5. The dielectric permittivity of a solid material is 2.25 x 10^{-10} F/m. Find out dielectric constant andelectric susceptibility of material.
6. Calculate flux density and magnetization of nickel if its magnetic field strength is 10^5 A/m and magnetic susceptibility is 0.654 x 10^{-5}.
7. Magnetic field intensity of a paramagnetic material is 10^4 A/m. At room temperature, itssusceptibility is 2.35 x 10^{-3}.Calculate magnetization of material.
8. The magnetic field intensity in a piece of ferrite is 10^6 A/m. If susceptibility of the material at room temperature is 2.90 x 10^{-3}. Calculate magnetization and flux density of material.

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