

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(EE/EEE) (Sem.-4th)

ELECTRICAL ENGINEERING MATERIALS

Subject Code : EE-208

Paper ID : [A0410]

Time : 3 Hrs.

Max. Marks : 60

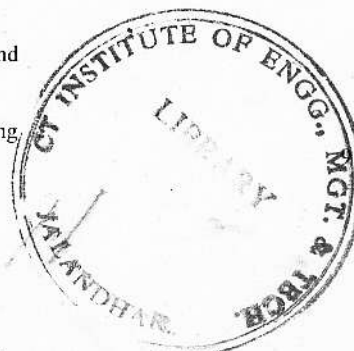
SECTION-B

- What do you mean by polarization of dielectric material in static fields?
- Explain electrical conductivity of metal. Explain the factors affecting it.
- Explain the term superconductivity. Explain the types of superconductors.
- Explain the characteristics of magnetic materials used in electrical engineering.
- Explain why, Curie Law was modified to Curie-Weiss Law.

SECTION-C

- Derive the Clausius-Mosotti relation for dielectric constant and deduce Lorentz-Lorenz equation.
- A conduction wire has a resistivity of $2.04 \times 10^{-8} \Omega \text{m}$ at room temperature. The Fermi energy for such a conductor is $5.8 \times 10^3 \text{ eV}$. Calculate
 - the mobility and relaxation time of the electron
 - the average drift velocity of the electrons when an electric field of 1.1 V/m is applied to the conductor
 - the velocity of an electron with the Fermi energy.
 - the mean free path of the electrons.

Explain ferromagnetic domains. Explain B-H curve and its application in transformer and induction motor design.

**INSTRUCTION TO CANDIDATES :**

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A**I. Write briefly :**

- Justify the presence of μ_r in the equation, $B = \mu_0 \mu_r H$.
- Define the quantity expressed by $\alpha_o = \frac{p_p^2}{3kT}$.
- Write the relationship for combined polarization as function of ϵ_r and atomic constant $\alpha_e, \alpha_i, \alpha_o$.
- Write an expression for the current through the capacitor considering complex dielectric.
- Explain the term "Debye Temperature".
- Give the expression for Curie-Weiss rule, explain.
- Give the material composition of soft solder rods.
- Draw arrangement of dipole moments in different magnetic materials.
- Draw B-H curves for transformer core and resistance filament materials.
- Derive Electric flux density 'D' from Coulomb's law.