

**B.TECH.****THEORY EXAMINATION (SEM-II) 2016-17****ENGINEERING PHYSICS-II****Time : 3 Hours****Max. Marks : 100****Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.****SECTION – A**

- 1. Explain the following:** **10 x 2 = 20**
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| a) What are polar and non-polar dielectrics?                 | e) What is an intrinsic semiconductor?                            |
| b) Define magnetic induction and intensity of magnetization. | f) Define Superconductivity.                                      |
| c) What do you mean by depth of penetration in a conductor?  | g) Define Nanoscience and nanotechnology.                         |
| d) Explain the concept of Maxwell's displacement current.    | h) Explain the Bragg's law.                                       |
|  | i) Define High Temperature Superconductors.                       |
|  | j) Give the relationship between <b>E, P</b> and <b>D</b> vector. |

**SECTION – B**

- 2. Attempt any five of the following questions:** **5 x 10 = 50**
- Derive an expression for electric field strength on a molecule within dielectric. Hence, obtain Clausius-Mossotti equation.
  - What is Langevin's theory of dia-magnetism? Show that the magnetic susceptibility is negative and independent of temperature.
  - The permittivity of diamond is  $1.46 \times 10^{-10} \text{ C}^2 \text{N}^{-1} \text{m}^{-2}$ . Determine its dielectric constant and electrical susceptibility. (Given  $\epsilon_0 = 8.86 \times 10^{-12} \text{ C}^2 \text{N}^{-1} \text{m}^{-2}$ )
  - An iron rod of volume  $10^{-3} \text{ m}^3$  and relative permeability 1200 is placed inside a long solenoid wound with 5 turns/cm. If a current of 0.5 amp is passed through the solenoid, find the magnetic moment of the rod
  - A beam of X-rays  $\lambda = 0.8 \text{ \AA}$  is incident on a crystal at a glancing angle of  $8^\circ 35'$  when the first order Bragg's diffraction occurs. Calculate the glancing angle for 3<sup>rd</sup> order diffraction.
  - What is Poynting vector? Discuss the work-energy theorem for the flow of energy in an electromagnetic field
  - Explain type-I and type-II superconductors. Also briefly discuss the important property that change during transition.
  - How does superconducting transition temperature vary with magnetic field? The transition temperature for Pb is 7.2 K. However it loses the superconductivity property if subjected to a magnetic field of  $3.3 \times 10^4 \text{ Amp/m}$ . find the value of  $H_c(0)$  which will allow the metal to retain its superconductivity at 5K.

**SECTION – C**

- Attempt any two of the following questions:** **2 x 15 = 30**
- What are carbon nanotubes? Explain CVC technique for its synthesis.
    - Assuming that all the energy from a 1000 Watt lamp is radiated uniformly; calculate the average value of intensities of electric and magnetic fields of radiation at a distance of 2 meter from lamp.
  - What is meant by polarization of substance? Mention the different mechanism of polarization in a dielectric.
  - Describe Bragg's spectrometer and derive the necessary formula and explain how it is used to study the structure of crystals.