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**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**

**a)** What are polar and non-polar dielectrics?

**b)** Define magnetic induction and intensity of magnetization.

**c)** What do by you mean by depth of penetration in a conductor?

**d)** Explain the concept of Maxwell's displacement current.

**e)** What is an intrinsic semiconductor?

**f)** Define Superconductivity.

**g)** Define Nanoscience and nanotechnology.

**h)** Explain the Bragg's law.

**i)** Define High Temperature Superconductors.

**j)** Give the relationship between **E, P** and **D** vector.

**SECTION – B**

**2. Attempt any five of the following questions:** **5 x 10 = 50**

**(a)** Derive an expression for electric field strength on a molecule within dielectric. Hence, obtain Claussius-Mossotti equation.

**(b)** What is Langevin's theory of dia-magnetism? Show that the magnetic susceptibility is negative and independent of temperature.

**(c)** The permittivity of diamond is $1.46 \times 10^{-10}$ $C^2N^{-1}m^{-2}$. Determine its dielectric constant and electrical susceptibility. (Given $\varepsilon_0 = 8.86 \times 10^{-12}$ $C^2N^{-1}m^{-2}$)

**(d)** An iron rod of volume $10^{-3}$ $m^3$ 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

**(e)** A beam of X-rays $\lambda = 0.8$ Å is incident on a crystal at a glancing angle of $8^0 35'$ when the first order Bragg's diffraction occurs. Calculating the glancing angle for 3rd order diffraction.

**(f)** What is Poynting vector? Discuss the work-energy theorem for the flow of energy in an electromagnetic field

**(g)** Explain type-I and type-II superconductors. Also briefly discuss the important property that change during transition.

**(h)** How does superconducting transition temperature vary with magnetic field? The transition temperature for Pb is 7.2 K. However it losses the superconductivity property if subjected to a magnetic field of $3.3 \times 10^4$ 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**

**3** (i) What are carbon nanotubes? Explain CVC technique for its synthesization.

(ii) 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.

**4** What is meant by polarization of substance? Mention the different mechanism of polarization in a dielectric.

**5** Describe Bragg's spectrometer and derive the necessary formula and explain how it is used to study the structure of crystals.