

**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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| <p>a) What are polar and non-polar dielectrics?</p> <p>b) Define magnetic induction and intensity of magnetization.</p> <p>c) What do you mean by depth of penetration in a conductor?</p> <p>d) Explain the concept of Maxwell's displacement current.</p> | <p>e) What is an intrinsic semiconductor?</p> <p>f) Define Superconductivity.</p> <p>g) Define Nanoscience and nanotechnology.</p> <p>h) Explain the Bragg's law.</p> <p>i) Define High Temperature Superconductors.</p> <p>j) Give the relationship between <b>E</b>, <b>P</b> and <b>D</b> vector.</p> |
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**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 Clausius-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  $1.46 \times 10^{-10} \text{ C}^2 \text{N}^{-1} \text{m}^{-2}$ . Determine its dielectric constant and electrical susceptibility. (Given  $\epsilon_0 = 8.86 \times 10^{-12} \text{ C}^2 \text{N}^{-1} \text{m}^{-2}$ )
  - (d) 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
  - (e) 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.
  - (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 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
- 3 (i) What are carbon nanotubes? Explain CVC technique for its synthesis.
  - (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.