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(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 199220 Roll No.

B. TECH.

Theory Examination (Semester-II) 2015-16

ENGINEERING PHYSICS-II

Time : 3 Hours ***Max. Marks : 100***

Note: This question paper contains 3 sections. Attempt questions from each section. Take standard values wherever needed.

Section-A

Q1. Attempt all parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)

(a) What is primitive's cell ?

(b) What is atomic radius of a simple cubic structure with a cube edge a ?

(c) What is internal field in dielectric ?

(d) What type of magnetic materials is used to make core of transformers ?

(e) What if displacement current ?

(f) If a plane electromagnetic wave in free space has magnitude of H 1 A/m. What is the magnitude of E ?

(g) Define the position of Fermi level in intrinsic semiconductor ?

(h) What do you understand by transition temperature ?

(i) What is the value of critical field of a super conductor at transition temperature ?

(j) What are the types of single walled nanotube ?

Section-B

Q2. Attempt any five questions from this section. (5×10=50)

(a) Define crystal structure, crystal lattice and Bravais lattice.

(b) Explain lattice planes in crystal. Determine inter-planer spacing of a lattice plane in a simple cubic lattice with edge 2 A° which cuts the axis in intercepts ratio 3:4:5.

(c) What do you mean by polarization of substance? Write different mechanisms of polarization in a dielectric.

(d) Show that susceptibility of diamagnetic material is negative and independent of temperature.

(e) Using Maxwell's equations derive electromagnetic wave equation in vacuum and prove that wave propagate with speed of light.

(f) What is Poynting vector? A 500 watt lamp radiates power uniformly in all directions. Calculate the electric and magnetic field intensities at 1 m distance from the lamp.

(g) How the temperature affects the critical field of a superconductor? The critical fields for lead are 1.8 × 106 A/m at 6 K and 2.4 × 106 A/m at 0 K. Find the critical temperature of the material.

(h) What are carbon nanotubes? Discuss its properties and applications.

Section-C

Note : Attempt any two questions from this section. (2×15=30)

Q3. Explain the Braggs law. Describe Bragg's spectrometer and explain with example how it is used to study the crystal structure?

Q4. (a) What is dielectric constant? Derive Clausius Mossotti equation for non polar solids having cubic structure.

(b) Explain the behavior of dielectric in an alternating electric field. What is relaxation time?

5. (a) Define drift velocity, mobility and conductivity of a semiconductor. Obtain expression for the electrical conductivity of an intrinsic semiconductor.

(b) Determine the number density of a donar atoms which has to be added to an intrinsic germanium semiconductor to produce a n-type semiconductor of conductivity 5 ohm^{-1} cm^{-1}, given that the mobility of electron in n-type germanium is 3900 $cm^2/(v - s)$. Neglect the contribution of holes to conductivity.