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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 1.46×10^{-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 3.3×10^4 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.

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