(Following Roll No. to be filled by candidate)

Roll No. 1 5 0 4 1 2 0 0 2 3

B TECH
SECOND SEMESTER EXAMINATION 2015-2016
EAS201
ENGINEERING PHYSICS

Time: 2 Hours **Max. Marks: 50**

Note: Attempt all questions. Marks and number of questions to be attempted from the section is mentioned before each section

1. Attempt all parts. [5X2]

   a. Discuss Bragg's law for X-ray diffraction.
   b. Show that in a non-dispersive medium group velocity is equal to phase velocity.
   c. Discuss the characteristics of Anti-ferromagnetic materials.
   d. Discuss the physical significance of wave function.
   e. Discuss important characteristics of Carbon nanotubes.

2. Attempt any three parts. [3X5]

   a. An X-ray photon is found to have doubled its wavelength on being scattered by 90°. Find the energy and wavelength of incident photon.
   b. Assuming that the critical magnetic field depends upon T, find the critical current density for 1 mm diameter wire of Pb at 4.2K. [Given T_c for Pb as 7.18K and H_0 for Pb as 6.51×10^4 A/m]
   c. If Earth receives 2 cal/min.cm^2 solar energy, what would be the amplitudes of electric and magnetic fields of radiation?
   d. A particle of charge q and mass m is accelerated through a potential difference V. Find its de-Broglie wavelength. Also calculate wavelength, if the particle is an electron and V = 50 Volts.

3. Attempt any one part. [1X5]

   a) Discuss the matter waves. Also discuss Davison-Germer experiment on electron diffraction as demonstration of matter waves.
   b) Discuss scattering of X-rays by free electrons in detail. Also deduce the expression for Compton shift.

4. Attempt any one part. [1X5]

   a. Discuss and derive Clausius-Mosotti equation.
   b. Discuss classical theory of Para magnetism.

5. Attempt any one part. [1X5]

   a. What are Maxwell's equations? Also write their signification.
   b. Discuss Poynting vector and derive Poynting theorem.

6. Attempt any one part. [1X5]

   a. Discuss CVD and Sol-gel technique for synthesis for nanoparticles.
   b. Differentiate Type I and Type II superconductors. Also discuss the formation of Cooper pairs

7. Attempt any one part. [1X5]

   a. Derive London equations. Discuss the Meissner effect and penetration depth using second London equation in detail.
   b. Derive electro-magnetic wave equation in conducting medium and find the solution of this equation.