Code No: 09A1BS02 **R09** **Set No. 1**

I B.Tech Regular Examinations,June 2010
ENGINEERING PHYSICS
Common to CE, ME, CHEM, BME, IT, MECT, MEP, AE, BT, AME, ICE, E.COMP.E, MMT, ETM, EIE, CSE, ECE, EEE

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the principle behind the functioning of an optical fibre.
   (b) Derive an expression for numerical aperture of an optical fibre.
   (c) Write any three applications of optical fibres. [4+7+4]
2. (a) Distinguish between intrinsic and extrinsic semicondutors.
   (b) Derive an expression for the density of holes in the valence band of an intrinsic semiconductor. [7+8]
3. (a) What is bonding in solids? Write the list of different types of bonding in solids.
   (b) Describe with suitable examples, the formation of ionic and covalent bonds in solids.
   (c) What is cohesive energy of a molecule? Explain. [4+7+4]
4. (a) What is Bloch theorem? Explain.
   (b) Write the conclusions given by Kronig-Penney model.
   (c) For an electron under motion in a periodic potential, plot the curve between the effective mass of the electron and wave number, and explain. [5+5+5]
5. (a) Describe any three processes by which nanomaterials are fabricated.
   (b) Describe the important applications of nanotechnology. [9+6]
6. (a) Define magnetic moment. What is Bohr magneton? Explain.
   (b) What are the characteristics of diamagnetic, paramagnetic and ferromagnetic substances? Explain their behavior with the help of examples.
   (c) If a magnetic field of strength 300 amp/metre produces a magnetization of 4200 A/m in a ferromagnetic material, find the relative permeability of the material. [3+9+3]
7. (a) Explain the concept of dual nature of the light.
   (b) Describe the experimental verification of matter waves using Davisson-Germer experiment.

(c) Calculate the wavelength of matter wave associated with a neutron whose kinetic energy is 1.5 times the rest mass of electron.
(Given that Mass of neutron = 1.676×10^{-27} kg, Mass of electron = 9.1×10^{-31} kg, Planck's constant = 6.62×10^{-34} J-sec, Velocity of light = 3×10^{8} m/s). [4+7+4]

8. (a) Write notes on Bragg's law.

(b) Describe Bragg's X-ray spectrometer method in the determination crystal structure.

(c) Calculate the glancing angle of (1 1 1) plane of a cubic crystal having axial length 0.19 nm corresponding to the second order diffraction maximum for the X-rays of wavelength 0.058 nm. [4+7+4]

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