

**I B.TECH – EXAMINATIONS, JUNE - 2011****APPLIED PHYSICS****(COMMON TO EEE, ECE, CSE, ECOMPE, EIE, ETM, IT, ICE, BME)****Time: 3hours****Max.Marks:80****Answer any FIVE questions  
All questions carry equal marks**

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- 1.a) Describe the various types of bonds in solids with suitable examples.
- b) Derive an expression for estimation of cohesive energy of a solid. [8+8]
  
- 2.a) Derive Bragg's law of crystal diffraction.
- b) Describe, in detail, Laue method to determine the crystal structure.
- c) A certain crystal reflects monochromatic X-rays strongly when Bragg's angle is  $15^\circ$  for the first order diffraction. Calculate the glancing angle for third order spectrum. [5+7+4]
  
- 3.a) Explain, in detail, Planck's quantum theory of radiation.
- b) Derive one-dimensional, time-independent Schrodinger wave equation.
- c) Calculate the first three permitted energy levels of an electron in a potential box of 0.1 nm width. [6+6+4]
  
- 4.a) How does the electrical resistance of a metal change with temperature?
- b) Explain Fermi-Dirac distribution for electrons in a metal. Discuss its variation with temperature.
- c) What is effective mass of an electron? [4+8+4]
  
- 5.a) What is meant by polarization of a dielectric material? Explain the different mechanisms of polarization in a dielectric material.
- b) How ferroelectrics are different from ordinary dielectrics? [10+6]
  
- 6.a) Obtain the equation for the conductivity of an intrinsic semiconductor, and hence explain the determination of energy gap.
- b) What are the drift and diffusion currents in a semiconductor? Explain. [10+6]
  
- 7.a) Describe the various methods to achieve population inversion in the case lasers.
- b) Describe the construction and working of a semi-conductor laser. [6+10]
  
- 8.a) Describe the construction and working of various types of optical fibers.
- b) Draw the block diagram of fiber optic communication system and explain the function of each block.
- c) Write the advantages of optical communication system. [6+6+4]

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