Code No: 09A1BS02 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B. Tech I Year Examinations, December-2012

ENGINEERING PHYSICS

(Common to all Branches)

Time: 3 hours **Max.**

Answer any five questions

All questions carry equal marks

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1.a) What is cohesive energy? Derive the expression for cohesive energy of an ionic solid.

b) Define the terms unit cell and coordination number. Classify seven crystal systems with neat diagrams and specify one example each. [8+7]

2.a) State Bragg's law in X-ray diffraction. Describe powder diffraction method to determine the lattice constant of cubic unit cell.

b) Deduce the expression for the concentration of Frenkel Defects.

c) A beam of X-rays of wavelength 0.071 nm is diffracted by (110) plane of certain crystal with lattice constant of 0.28 nm. Find the glancing angle for the first order diffraction. [8+4+3]

3.a) Distinguish between Maxwell-Bose-Einstein and Fermi–Dirac statistical distributions qualitatively. What is an electron gas?

b) State and explain Heisenberg's Uncertainty principle. Describe particle in one dimension box using wave mechanics. [8+7]

4.a) Discuss the behavior of electron in a periodic potential. Explain the concept of effective mass of electron and hole.

b) Explain the classification of solids as conductors, semiconductors and insulators. [10+5]

5.a) Derive the expression for the concentration of carriers in case of an intrinsic semiconductor.

b) Describe the working of PN diode as rectifier. What is the working principle of photo diode?

c) The Hall coefficient of a semiconductor is 3.22×10^{-4} m^3 C^{-1}. Its resistivity is 8.5×10^{-3} ohm–m. Calculate the carrier concentration of carriers. [7+5+3]

6.a) Explain in detail electronic, ionic and orientation polarization.

b) What is Magnetic levitation? Distinguish between soft and hard ferromagnetic materials. [8+7]

7.a) Describe the working of He – Ne laser with energy level diagram.

b) Derive the expression for the numerical aperture of a fiber.

c) The refractive indices of core and cladding materials of a step index fiber are 1.48 and 1.45 respectively. Find the numerical aperture and acceptance angle. [8+4+3]

8.a) Define reverberation and reverberation time. Write Sabine's expression for reverberation time and explain Sabine's formula. Describe a method to m absorption co-efficient.

b) What is surface quantum confinement in nano materials? Describe the method for fabrication of nano material.

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