Code No: 09A1BS02 **R09**

B. Tech I Year Examinations, May/June -2012

ENGINEERING PHYSICS

(Common to all Branches)

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

Answer any five questions

All questions carry equal marks

---

1. a) Discuss with suitable mathematical expressions, the Kronig-Penney model for the energies of an electron in a solid qualitatively.
   b) Explain the concept of effective mass of an electron. [9+6]
2. a) Describe with neat diagram the structures of Diamond and ZnS.
   b) Describe with suitable examples, the formation of ionic and covalent bonds in solids.
   c) What is cohesive energy of a molecule? Explain. [6+5+4]
3. a) Write notes on:
   i. Origin of nanotechnology and
   ii. Nano-scale.
   b) Describe the processes of "physical vapour deposition" and "pulsed laser vapour deposition" in the fabrication of nanostructures.
   c) Define reverberation time and explain Sabine's formula. [4+7+4]
4. a) Obtain the relevant mathematical expressions for
   i. Electronic polarizability and
   ii. Ionic polarizability.
   b) Describe domain theory of ferromagnetism on the basis of Hysterisis curve.
   c) Super conductor exhibits perfect diamagnetism – Explain. [7+4+4]
5. a) Derive an expression for density of holes in intrinsic semiconductors.
   b) Discuss I –V characteristics of a p – n Junction diode.
   c) For an intrinsic semiconductor having band gap of 0.78 eV, find the carrier concentration at 37^0C. [Given that the effective mass of electron =effective mass of hole = rest mass of electron]. [7+4+4]
6. a) Distinguish between Max well – Boltsmann Statistics and Fermi – Dirac Statistics.
   b) Write short notes on:
   i. De Broglie wavelength and
   ii. Heisenberg's uncertainty principle.
   c) Calculate the energies that can be possessed by a particle of mass 8.50×10^{-31} kg which is placed in an infinite potential box of width 10^{-9} cm. [7+4+4]

7. a) Distinguish between Schottky and Frenkel defects. Explain the concept of Burger's vector.

b) Describe with neat diagram, the Laue method of X-ray diffraction. What does each intense point in X-ray diffraction represent in Laue pattern?

c) When a monochromatic X-ray beam of X-rays of wavelength 0.1542 nm is used, the first order reaction from (1 0 1) plane occurs at θ. If the lattice parameter is 0.433 nm, find the value of θ. [3+9+3]

8. a) Write a brief note on 'Einstein's coefficients'.

b) Describe the construction and working of CO_2 laser. How is it different from He-Ne laser?

c) Explain the principle behind the propagation of light signal through an optical fiber. [4+7+4]

*****