

I B.Tech Supplementary Examinations, November/December 2005**APPLIED PHYSICS**

(Common to Electrical & Electronic Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics and Electronics & Computer Engineering)

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What is cohesive energy? Assuming a suitable model for interatomic forces derive an expression for the cohesive energy.
 (b) What is Madelung constant? Calculate its value for NaCl. [10+6]
2. (a) What are Miller indices? How are they obtained?
 (b) Derive an expression for the interplanar spacing between two adjacent planes of a cubic lattice.
 (c) Sketch (100), (110) and (111) planes of a cubic crystal. [5+8+3]
3. (a) Derive Bragg's law for X-ray diffraction in crystals.
 (b) Describe Laue's method for determination of crystal structure.
 (c) A beam of X-rays ($\lambda = 1 \text{ \AA}$) is made to incident on a set of crystal planes whose separation is 5 \AA . Calculate the angle for the fourth Bragg reflection. [6+6+4]
4. (a) Derive time independent Schrodinger wave equation for an electron.
 (b) What is the physical significance of the wave function?
 (c) Show that the energies of a particle in a potential box are quantized. [8+4+4]
5. (a) Explain in detail the following
 - i. Meissner effect and
 - ii. Penetration depth.
 (b) What are hard and soft superconductors? Explain. [10+6]
6. (a) Explain the terms
 - i. magnetic flux density
 - ii. magnetic field strength
 - iii. magnetization and
 - iv. magnetic susceptibility. How are they related to each other?
 (b) Explain the difference between antiferromagnetism and ferri-magnetism. [10+6]

7. (a) Derive the expressions for
- i. acceptance angle and
 - ii. numerical aperture of an optical fiber.
- (b) Describe different types of fibres by giving the refractive index profiles and propagation details. [8+8]
8. Write short notes on the following
- (a) Line Imperfections of crystals
 - (b) Kronig-Penney model.
 - (c) Electronic polarization
 - (d) He-Ne laser. [4×4]

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