

January 2013

M. Sc. IIIrd Semester Examination

PHYSICS

First Paper : Condensed Matter Physics - I

Time 3 Hours]

[Max. Marks 85

Note : Attempt all questions. The blind candidates will be given 60 minutes extra time.

1. Answer any five of the following :
- (a) Draw the sketch of NaCl structure and show the following planes 100, 110, 111.
 - (b) Draw CsCl structure and write how it is possible to change CsCl to NaCl structure.
 - (c) What is the limits of Brillouin Zones ?
 - (d) Write down the Bragg diffraction condition.
 - (e) Define Stress and Strain for a solid.
 - (f) What do you mean by elastically isotropic and anisotropic body ?
 - (g) Sketch the vibrational spectrum of Monoatomic lattice.
 - (h) Differentiate in between Diffraction and Scattering.
 - (i) Differentiate in between Harmonicity and Anharmonicity in Vibration.
 - (j) Define Skin effect Under what condition the skin depth turns out to be anomalous http://www.davvonline.com $5 \times 5 = 25$
2. Describe Bravis 14 space lattice indicating their symmetry elements.
- OR
- Answer the following :
- (a) Closed Packet Structure
 - (b) Packing Fraction
 - (c) Miller Indices 12
3. Describe Bragg diffraction equation. How it leads to the definition of Reciprocal lattice vectors ? Obtain the Reciprocal lattice vectors for FCC structure.
- OR
- Obtain Reciprocal vector for BCC structure. What is the significance of Brillouin Zone ? 12
4. Obtain the velocity of ultrasonic wave in a cubic body along (100) direction. How this velocity is useful to calculate the elastic constants ?
- OR
- Define elastic compliance and stiffness constants. In general how many elastic constants exists. How for cubic, they reduces to three ? 12
5. Derive dispersion relation for diatomic lattice.
- OR
- Describe scattering of photons and neutrons by phonons. What do you mean by inelastic scattering of X-ray ? 12
6. Write short notes on any two of the following :
- (a) Thermal Expansion
 - (b) Equation of State of Solids
 - (c) Cyclotron Resonance
 - (d) De Haas Von Alphen Effect 12