

- 3** Write any **two** : **7×2=14**
- (a) Write difference between mono atomic and diatomic lattice. Explain three dimensional lattice.
 - (b) Explain neutrons scattering by phonons. Define phonon spectroscopy.
 - (c) Discussion semiconductor devices. Show that in the diatomic vibration, the absorption frequency
$$W = [2f (1/m + 1/M)]^{1/2}$$
- 4** Write any **two** : **7×2=14**
- (a) Define periodic potential, state and prove Bloch theorem.
 - (b) Derive relation for Heat capacity in free electron gas.
 - (c) Explain hall effect. Define Bloch electron and thermal conductivity.
- 5** Write any **two** : **7×2=14**
- (a) Write the properties and application of superconductor. Define superconductivity.
 - (b) Define high temperature superconductor and HTSC oxides superconductor. Explain Josephson effect.
 - (c) Define B.C.S. theory, if $m \cdot dv/dt = -eE$ where e is the charge and m is the mass of the carrier respectively. Show that $\lambda = mc^2 / 4\pi ne^2$ where λ = London penetration depth.
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