NPTEL Video Course - Physics - NOC:Introduction to Solid State Physics

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Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 30 - Bravais Lattice Types - Part 2
Lecture 31 - Introduction to different crystal types - Part 1
Lecture 32 - Introduction to different crystal types - Part 2
Lecture 33 - Indexing crystal planes
Lecture 34 - Scattering of X rays from crystals - Part 1
Lecture 35 - Scattering of X rays from crystals - Part 2
Lecture 36 - Reciprocal lattice vectors - Part 1
Lecture 37 - Reciprocal lattice vectors - Part 2
Lecture 38 - Reciprocal lattice vectors and Laue's condition for diffraction of waves in crystals - Part 1
Lecture 39 - Reciprocal lattice vectors and Laue's condition for diffraction of waves in crystals - Part 2
Lecture 40 - Reciprocal lattice vectors, Laue's condition and Bragg's law for diffraction of waves by a cryst
Lecture 41 - Wave equation in a continuous medium and generalization to a discrete medium
Lecture 42 - Derivation of wave equation for motion of atoms in a crystal
Lecture 43 - Solution of the wave equation for a crystal and the relation between frequency Ã•â ° and waveved
Lecture 44 - Group velocity of waves and speed of sound in a crystal
Lecture 45 - Waves in a crystal considering interaction among atoms beyond their nearest neighbours
Lecture 46 - Normal modes in a crystal
Lecture 47 - Experimental determination of Phonon dispersion curves
Lecture 48 - Lattice with two atom basis
Lecture 49 - Displacement of the atoms for the acoustic and optical Phonons
Lecture 50 - Density of states of phonons
Lecture 51 - Calculating the density of states of Phonons
Lecture 52 - Average energy of Phonons at Temperature T
Lecture 53 - Debye's Model of specific heat of crystals
Lecture 54 - Anharmonic effects in crystals
Lecture 55 - Going beyond free electron model
Lecture 56 - Applying perturbation theory to free electron wavefunctions and nearly free electron model
Lecture 57 - Applying perturbation theory to free electron wavefunctions and creation of energy gap at zone b
Lecture 58 - Mixing of plane waves to get Bloch Wavefunction - I
Lecture 59 - Mixing of plane waves to get Bloch Wavefunction - II
Lecture 60 - Equivalence of wave vectors k and k+G and reduced zone scheme
Lecture 61 - Applying periodic boundary condition to Bloch wavefunction and counting the number of states
Lecture 62 - Band theory of metals, insulators and semiconductors
Lecture 63 - Kronig- Penney model
Lecture 64 - Bloch wavefunction as a linear combination of atomic orbitals
Lecture 65 - Tight Binding Model - II
Lecture 66 - Semiclassical dynamics of a particle in a band and Bloch oscillations
Lecture 67 - Experimental observations of Bloch oscillations
Lecture 68 - Concept of hole as a current carrier in semiconductors - I

Lecture 69 - Concept of hole as a current carrier in semiconductors - II
Lecture 70 - Calculating carrier density in semiconductors - I
Lecture 71 - Calculating carrier density in semiconductors - II
Lecture 72 - Donor and acceptor energy levels in a semiconductor
Lecture 73 - charge carrier density in n-type and p-type semiconductors
Lecture 74 - Electrical conductivity and hall coefficient in semiconductors
Lecture 75 - Paramagnetism in solids I - Magnetic moment and Lande g factor for atoms
Lecture 76 - Paramagnetism in solids II - temperature dependence of paramagnetic susceptibility and Curie's L
Lecture 77 - Hund's rule for calculating the total angular momentum J, orbital angular momentum L and spin ar
Lecture 78 - Examples of performing paramagnetic susceptibility calculations
Lecture 79 - Diamagnetism in Solids
Lecture 80 - Understanding quenching of orbital angular momentum in transition metal ions
Lecture 81 - Ferromagnetism in solids
Lecture 82 - Introduction to Meissner state of superconductors and levitation
Lecture 83 - Superconducting materials and Type-I and Type-II superconductors
Lecture 84 - London's equation for superconductors
Lecture 85 - Application of London's equation, behavior
Lecture 86 - A qualitative introduction to BCS theory of superconductivity
Lecture 87 - Josephson's effect in superconductors and tunneling current across barriers