NPTEL Video Course - Physics - NOC:Solid State Physics (2021)

Subject Co-ordinator - Prof. Nirmal Ganguli

Co-ordinating Institute - IISER - Bhopal

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

Lecture 30 - The Sommerfeld theory for conduction in metals
Lecture 31 - Thermal conductivity
Lecture 32 - One dimensional chain of atoms
Lecture 33 - One dimensional chain of atoms
Lecture 34 - Periodic boundary condition
Lecture 35 - Energy levels in periodic array of quantum wells
Lecture 36 - Tunneling of electrons
Lecture 37 - Reflection and transmission amplitudes and coefficients
Lecture 38 - Transfer matrix for a rectangular barrier
Lecture 39 - Electron tunneling through a periodic potential
Lecture 40 - The tight-binding approximation
Lecture 41 - Tridiagonal matrices and continued fraction
Lecture 42 - Plane-wave basis for nearly free electrons
Lecture 43 - Nearly free electron approximation
Lecture 44 - Dynamical aspects of electrons in band theory
Lecture 45 - Semiconductor crystals
Lecture 46 - Effective mass
Lecture 47 - Carrier concentration
Lecture 48 - Mobility, impurity conductivity, and Fermi surface
Lecture 49 - Vibration of crystals with monatomic basis
Lecture 50 - Analyzing the dispersion relation
Lecture 51 - Phonons with diatomic basis
Lecture 52 - Quantization of elastic waves
Lecture 53 - Phonon heat capacity
Lecture 54 - Phonon density of states
Lecture 55 - Introduction to diamagnetism
Lecture 56 - Issues with the classical theory of diamagnetism
Lecture 57 - Quantum theory of diamagnetism
Lecture 58 - The quantum theory of paramagnetism
Lecture 59 - Rare earth atoms, Hund's rule
Lecture 60 - Crystal field splitting
Lecture 61 - Quenching of orbital angular momentum
Lecture 62 - Paramagnetic susceptibility of conduction electrons
Lecture 63 - Ferromagnetism
Lecture 64 - Antiferromagnetism and ferrimagnetism
Lecture 65 - Introduction to superconductivity
Lecture 66 - Thermodynamics of superconducting transition,London equation
Lecture 67 - BCS theory of superconductivity
Lecture 68 - Flux quantization in a superconducting ring

Lecture 69 - Single particle tunneling and Josephson effect
Lecture 70 - AC Josephson effect and microscopic quantum interference