

## NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Physics - NOC:Electronic Theory of Solids

Subject Co-ordinator - Prof. Arghya Taraphder

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Free electrons
- Lecture 2 - Weidemann Franz Law
- Lecture 3 - Drude Model continued
- Lecture 4 - Schrodinger Equation
- Lecture 5 - Density of States
- Lecture 6 - Properties of Degenerate Fermi Gas
- Lecture 7 - Statistics Fermi-Dirac distribution and Maxwell-Boltzmann Distribution
- Lecture 8 - Sommerfeld Expansion and Band Formation
- Lecture 9 - Bonding and Band Formation
- Lecture 10 - Variational Method
- Lecture 11 - Bonding and Band Formation (LCAO)
- Lecture 12 - Bonding and Band Formation (LCAO) (Continued...)
- Lecture 13 - Bloch's Theorem
- Lecture 14 - Proof of Bloch's Theorem
- Lecture 15 - N atoms Solid
- Lecture 16 - Brillouin Zones
- Lecture 17 - Tight binding
- Lecture 18 - Fermi Surfaces
- Lecture 19 - Lattice with basis
- Lecture 20 - Energy spectrum (Continued...)
- Lecture 21 - Graphene and Fermi Surfaces
- Lecture 22 - Fermi Surfaces Instabilities
- Lecture 23 - Low Dimensional Systems
- Lecture 24 - Integer Quantum Hall Effect (IQHE)
- Lecture 25 - Integer Quantum Hall Effect (Continued...)
- Lecture 26 - Electron in a Strong Magnetic Field and IQHE
- Lecture 27 - Spintronics
- Lecture 28 - Magnetism
- Lecture 29 - Magnetism

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- Lecture 30 - Hund's Rule
- Lecture 31 - Curie's Law and Van Vleck Paramagnetism
- Lecture 32 - Curie's law for any J, Susceptibility
- Lecture 33 - Susceptibility and Thermal Properties
- Lecture 34 - Adiabatic Demagnetisation
- Lecture 35 - Pauli Paramagnetism
- Lecture 36 - Paramagnetism of metals
- Lecture 37 - Exchange interaction for 2 electrons
- Lecture 38 - Exchange interactions of different types
- Lecture 39 - Magnetic Order
- Lecture 40 - Magnetic Order of different types and Heisenberg model
- Lecture 41 - Ising Model
- Lecture 42 - Mean Field Theory
- Lecture 43 - Spontaneous magnetisation and 1D Ising Model
- Lecture 44 - Symmetries of Ising model, Exact Solution
- Lecture 45 - Ferromagnetic Heisenberg Model
- Lecture 46 - Ground State and Magnons/Excitations
- Lecture 47 - Superconductivity
- Lecture 48 - London Equation
- Lecture 49 - Meisner Effect from London Equation
- Lecture 50 - Cooper problem
- Lecture 51 - Instability of the Fermi Surface
- Lecture 52 - Ground state of cooper problem, BCS Ground state
- Lecture 53 - BCS Theory, Excitation Spectrum
- Lecture 54 - BCS
- Lecture 55 - Tunneling and Ginzberg Landau Theory
- Lecture 56 - Electrodynamics of Superconductivity
- Lecture 57 - Type II superconductors
- Lecture 58 - Josephson junction
- Lecture 59 - Vortices, SQUID, Quantum Supremacy and Qubits
- Lecture 60 - Topological state of matter, XY Model, Topological Insulators