

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

NPTEL Video Course - Mechanical Engineering - NOC:Basics of Materials Engineering

Subject Co-ordinator - Prof. Ratna Kumar Annabattula

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction

Lecture 2 - Material Property Landscape

Lecture 3 - Crystal Structure-1 (Platonic Solids)

Lecture 4 - Crystal Structure-2 (Unit Cell, Lattice, Crystal)

Lecture 5 - Crystal Structure-3 (Bravais lattice, Symmetry in Crystals)

Lecture 6 - Crystal Structure-4 (Miller Indices for Crystallographic Points and Directions)

Lecture 7 - Crystal Structure-5 (Miller-Bravais Indices, Linear and Planar Density)

Lecture 8 - Crystal Structure-6 (Planar density, Close-Packed Structures, Stacking Faults)

Lecture 9 - Crystal Structure-7 (Single Crystal and Polycrystalline Materials)

Lecture 10 - Crystal Structure-8 (X-Ray Diffraction and Determination of Structure)

Lecture 11 - Defects in Crystalline Materials-1 (Types of Crystalline Defects)

Lecture 12 - Defects in Crystalline Materials-1 (Point Defects)

Lecture 13 - Defects in Crystalline Materials-1 (Equilibrium Concentration of Vacancies)

Lecture 14 - Defects in Crystalline Materials-1 (Theoretical Shear Strength)

Lecture 15 - Defects in Crystalline Materials-2 (Effect of Point Defects)

Lecture 16 - Defects in Crystalline Materials-2 (Point Defects and Solid Solutions)

Lecture 17 - Defects in Crystalline Materials-3 (Line Defects, Types of Dislocations and their Characteristics)

Lecture 18 - Defects in Crystalline Materials-4 (Slip Systems, Burger's Vector and Dislocation Motion)

Lecture 19 - Defects in Crystalline Materials-4 (Slip in Single Crystals and Resolved Shear Stress)

Lecture 20 - Defects in Crystalline Materials-5 (Different Stages of Slip in Single Crystalline Materials)

Lecture 21 - Defects in Crystalline Materials-5 (Geometry and Slip, Stress Field Around a Dislocation and Defects)

Lecture 22 - Defects in Crystalline Materials-6 (Twinning, Interfacial Defects and Volume Defects)

Lecture 23 - Defects in Crystalline Materials-6 (Strengthening Mechanisms)

Lecture 24 - Defects in Crystalline Materials-7 (Plastic deformation in polycrystalline materials, Softening)

Lecture 25 - Mechanical Properties of Materials (Concept of Stress Tensor)

Lecture 26 - Mechanical Properties (Tension Test-Elastic Deformation)

Lecture 27 - Mechanical Properties (Tension Test - Plastic Deformation)

Lecture 28 - Mechanical Properties (Tension Test - Plastic Deformation)

Lecture 29 - Mechanical Properties (Hardness Test)

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- Lecture 30 - Static Failure Theories (Introduction, Definition of Failure)
- Lecture 31 - Static Failure Theories (General form of failure theory, Stress tensor, Principal stress)
- Lecture 32 - Static Failure Theories (Distortion Energy Theory)
- Lecture 33 - Static Failure Theories (Maximum Shear Stress Theory)
- Lecture 34 - Static Failure Theories (Design Problems)
- Lecture 35 - Static Failure Theories (Failure of Brittle Materials)
- Lecture 36 - Static Failure Theories (Coulomb-Mohr and Modified Coulomb-Mohr)
- Lecture 37 - Static Failure Theories (Notches and Stress Concentration)
- Lecture 38 - Introduction to Fracture Mechanics, Griffith's Analysis of a Cracked Body
- Lecture 39 - Fracture Mechanics (Energy Release Rate)
- Lecture 40 - Fracture Mechanics (Crack Resistance, Stress Intensity Factor, Fracture Toughness)
- Lecture 41 - Fatigue Failure of Materials (Introduction, Historical Events, S-N Diagram)
- Lecture 42 - Fatigue Failure of Materials (S-N Diagram, Types of Time Varying Loads)
- Lecture 43 - Fatigue Failure of Materials (High Cycle Fatigue, Low Cycle Fatigue, Stress Ratio, Amplitude Ratio)
- Lecture 44 - Fatigue Failure of Materials (Rotating Beam Bending Test, Estimated S-N diagram)
- Lecture 45 - Fatigue Failure Theories (Fatigue strength correction factors)
- Lecture 46 - Problems on Fatigue Failure-1 (S-N diagram and Corrected endurance strength)
- Lecture 47 - Fatigue Failure of Materials (Features of Fatigue Failure; Factor of Safety in Life and Stress)
- Lecture 48 - Fatigue Failure of Materials (Effect of Mean Stress)
- Lecture 49 - Fatigue Failure of Materials (Multiaxial Fatigue and Variable Amplitude Loading)
- Lecture 50 - Fatigue Failure of Materials (Fatigue Stress Concentration Factor)
- Lecture 51 - Fatigue Failure of Materials (Fatigue Crack Growth, Paris' law)
- Lecture 52 - Problems on Fatigue Failure-2 (Effect of mean stress, Fatigue crack growth)
- Lecture 53 - Problems on Fatigue Failure-3 (Effect of Notch, Multiaxial Loading)
- Lecture 54 - Phase Diagrams (Introduction)
- Lecture 55 - Phase Diagrams (Language of Phase Diagrams, Types of Binary Phase Alloys)
- Lecture 56 - Phase Diagrams (Tie line, Lever Rule, Identification of compositions and weight fractions in two phase region)
- Lecture 57 - Phase Diagrams (Type I)
- Lecture 58 - Phase Diagrams (Congruent Melting Alloys, Type II Alloys, Eutectic Reaction)
- Lecture 59 - Phase Diagrams (Type III Alloys with Partial Solubility in Solid State)
- Lecture 60 - Phase Diagrams (Congruent melting alloys, Peritectic Reaction, Monotectic Reaction)
- Lecture 61 - Phase Diagrams (Allotropy, Eutectoid and Peritectoid Reactions)
- Lecture 62 - Phase Diagrams (Iron-Iron Carbide Phase Diagram)
- Lecture 63 - Kinetics of Phase Transformations (Homogeneous Nucleation)
- Lecture 64 - Kinetics of Phase Transformations (Heterogeneous Nucleation)
- Lecture 65 - Isothermal Transformation Diagram
- Lecture 66 - Martensite Transformation, C-C-T Diagram
- Lecture 67 - Heat Treatment of Steels (Annealing and Normalizing)