

Applied Physics: as per new JNTU syllabus 2005–2006

Relevant Table of Contents

1. Structure of Matter and Crystallography

- Bonding in solids
- Crystal lattices and unit cells
- Common crystal structures
- Miller indices
- Atomic packing and density

2. X-ray Diffraction

- Nature of X-rays
- Production of X-rays
- Bragg's law
- Diffraction methods
- Applications to crystal analysis

3. Crystal Defects

- Point defects
- Vacancies, interstitials, impurities
- Dislocations
- Effect of defects on material properties

4. Elements of Statistical Mechanics

- Macrostate and microstate
- Statistical distributions
- Concepts of energy and probability
- Simple physical applications

5. Principles of Quantum Mechanics

- Blackbody radiation
- Planck's hypothesis
- Photoelectric effect
- Wave-particle duality

- Uncertainty principle
- Schrödinger equation (basic concepts)

6. Band Theory of Solids

- Electrons in solids
- Formation of energy bands
- Conductors, insulators, and semiconductors
- Fermi level

7. Semiconductor Physics

- Intrinsic and extrinsic semiconductors
- n-type and p-type doping
- Conductivity of semiconductors
- Hall effect

8. Semiconductor Devices

- p-n junction
- Diode and its characteristics
- Rectification
- Transistor: principle of operation
- Basic applications

9. Dielectric Properties

- Electric polarization
- Dielectric constant
- Types of polarization
- Dielectric materials and applications

10. Magnetic Properties

- Magnetization and permeability
- Diamagnetic, paramagnetic, and ferromagnetic materials
- Hysteresis cycle
- Applications of magnetic materials

11. Lasers

- Spontaneous and stimulated emission

- Population inversion
- Laser principle
- Types of lasers
- Applications of lasers

12. Optical Fibers

- Principle of propagation
- Total internal reflection
- Numerical aperture
- Step-index and graded-index fibers
- Applications of optical fibers

Note:

This is a relevant reconstructed table of contents based on the JNTU 2005-2006 Applied Physics syllabus and closely related editions.