

## **Core theory course (Disciplinary)**

### **CPH-402: SOLID STATE PHYSICS-I AND ELECTRONICS-I**

#### **UNIT- I**

##### **Electron Energy Bands :**

Consequences of Periodicity –Bloch Theorem, Periodicity of Bloch Function and their eigenvalues, Wave mechanical Interpretation of Energy Bands, The Kronig-Penney Model, The Nearly Free Electron Model, Zone Scheme for Energy Bands, Energy Bands in a General Periodic Potential, Insulators-Semiconductor and Metals, The Tight –binding Approximation, The Wigner-Seitz Cellular Method.

##### **Basic reference :**

Elements of Solid state Physics by J.P.Srivastava, PHI, New Delhi.

#### **UNIT- II**

##### **Mobile Electrons and Fermi Surfaces :**

Concept of Holes, Effective Mass, Construction of the Fermi Surfaces, Electrons in a Uniform Magnetic Field –Free Electrons and Bloch Electrons, Anomalous Skin Effect, Cyclotron Resonance-Semiconductor and Metals, Closed Orbits and Open Orbits, de Hass – van Alphen Effect.

##### **Basic reference :**

Elements of Solid state Physics by J.P.Srivastava, PHI, New Delhi.

#### **UNIT- III**

##### **(a) Power Amplifiers :**

Introduction, Difference between Voltage and Power amplifiers, Performance quantities of power amplifiers, Class-A power amplifier, and power distribution, Transformer coupled class –A amplifier, Power consideration and dissipation, Class-B power amplifier, Class-A Push-Pull power amplifier, Class-B Push-Pull amplifier, Tuned amplifiers, Single tuned inductively coupled transistor amplifier, Double tuned transistor amplifier.

##### **(b) Multivibrators:**

Multivibrators, Astable multivibrator, Monostable multivibrator, Bistable multivibrator.

##### **Basic reference :**

Hand Book of Electronics by Gupta and Kumar, Pragati Prakashan Meerut.

#### **UNIT- IV**

##### **Operational Amplifiers :**

Basic Concepts, Ideal operational amplifier, Practical Inverting and Non-Inverting OP-AMP, Characteristics of OP-AMP, Differential Amplifier, Some Op-AMP Parameters, Effects of offset, Frequency Response and Stability, Applications of OP-AMP: As a Scale Changing-Phase Shifting and Summing amplifier, Voltage Follower, Integrator, Differentiator, Logarithmic and Antilogarithmic amplifier, Bridge amplifier, Schmitt Trigger, Saw-tooth wave generator, The 555 IC Timer-as a Monostable and Astable multivibrator, Bootstrap Sweep generator.

##### **Basic reference :**

Hand Book of Electronics by Gupta and Kumar, Pragati Prakashan Meerut.

##### **Other references :**

- (1) Electronics and Radio Engineering by M.L. Gupta, D.R. Pub.Co. New Delhi.
- (2) Integrated Circuits by K.R.Botkar Khanna Pub.
- (3) Electronics fundamental and applications by John D Ryder ,PHI.
- (4) Integrated Electronics by Millman and Halkias,Int. Student/s Edition .
- (6) OP-AMPs and Linear Integrated Circuits by R.A. Gayakwad, PHI Pub.
- (7) Basic Electronics and Linear Circuits by N.N.Bhargava, D.C.Kulshreshtha, S.C.Gupta.
- (8) Electronic Devices and Circuits by A.Mottershead Prentice – Hall of India.