

## Important questions for B. Sc. III<sup>rd</sup> year (Physics II<sup>nd</sup> paper)

### Unit-1:

- Q.1- Define lattice, basis and unit cell. Name the seven systems of crystals and state the relationship between the sides of their unit cell and the angles between the axes of their unit cell and write down the relationship between the lattice constants and the angles between the edges of unit cell for a cubic crystal.
- Q.2- Explain the elements of symmetry of unit cell and find them for a cubic cell.
- Q.3- Explain Co-ordination number and Packing density of crystalline structure.
- Q.4- What are Miller Indices? Explain the method of finding the Miller Indices of a plain.
- Q.5- What is meant by X-ray diffraction? Drive Bragg's equation.
- Q.6- Write short notes on :
1. Crystal structure
  2. Bravais's Lattice
  3. Reciprocal Lattice.
- Q.7- Describe different types of bonding. How are solids classified on the basis of bondings.

### Unit-2:

- Q.1- Deduce is Dulong and Petit's law for specific heat of solids? Describe it from the classical theory.
- Q.2- Compare Einstein & Debye theory of specific heat.
- Q.3- Write short notes on:
1. Concept of phonons
  2. Vibrations of one dimensional monoatomic lattice
  3. Brillion zone
- Q.4- What is Hall effect? Deduce the expression for Hall coefficient and Hall voltage.
- Q.5- Differentiate between the paramagnetic, diamagnetic and ferromagnetism.
- Q.6- What do you mean by drift velocity inside the metal?
- Q.7- Explain in short the free electron theory.

### Unit-3:

Q.1- What is meant by P-N junction and how it is made? Draw the I-V characteristics curve for P-N junction diode.

Q.2- Write short notes on

1. Depletion layer
2. Fermi level
3. Potential barrier
4. Zener breakdown
5. Avalanche breakdown

Q.3- Write short notes on

1. LED
2. Photo Diode
3. Rectifier
4. Solar cell
5. Transformer
6. Ripple factor

Q.4- Explain JFET with construction and working with its characteristics curve.

Q.5- Explain PNP and NPN transistor with its characteristics curve.

Q.6- What are CE, CB and CC modes of transistor, draw its circuit diagram.

Q.7- Obtain the relationship between  $\alpha$ ,  $\beta$  and  $\gamma$  parameters of a transistors.

### Unit-4:

Q.1- What is an Amplifier? Explain amplification process by using transistor.

Q.2- State different configurations in which a transistor is used for amplification.

Q.3- Define hybrid parameters, Write h parameters in different configuration and state its importance.

Q.4- How a transistor used as a power amplifier.

Q.5- Write short notes on:

1. Push Pull amplifiers 2. R-C coupled amplifier 3. Feed-back amplifier 4. Distortion and noise in amplifiers.

Q.6- What is an Oscillator? Establish Bark-Hausen condition for it.

Q.7- Explain in short R-C phase shift oscillator.

Q.8- Write short notes on:

1. Modulation and De-Modulation 2. Amplitude Modulation 3. Frequency Modulation 4. Phase Modulation 5. Detection

## Unit-5:

- Q.1- What are nano particles? Describe their size and structure.
- Q.2- What is lithography? Explain it.
- Q.3- Describe the wet chemical method of synthesis of nano particles.
- Q.4- Write an essay on application of nano technology.
- Q.5- Write short notes on:
1. Size dependence of properties of nano particles.
  2. Metal and Semiconductor nano particles