

## Unit 1

1. Explain the electronic structure of atoms
2. Explain the following principles with sketches
  - i) Pauli's Exclusion Principle
  - ii) Hund's Principle
  - iii) Aufbau Principle
3. Describe shells, subshells and orbitals.
4. Describe different types of atomic bonds.
5. Write the classification of molecular bond and explain with sketches.
6. Illustrate energy bands in metals, insulators and semiconductors.
7. Explain following crystal structure and find co-ordination number and APF
  - i) HCP
  - ii) BCC
  - iii) FCC
8. Classify imperfection of crystals and describe with examples.
9. Differentiate between edge and screw dislocation.
10. Enumerate the role of dislocation for plastic deformation
11. Classify materials with examples.
12. Write the properties and applications of following materials  
polymers, metals and alloys, ceramics, semiconductors, composites, biomaterials.

## Unit 2

1. Explain the working principle of following thermoelectric effects: a) Seebeck b) Peltier c) Thomson. (Diagrams and equations are must)
2. Define the following: a) thermal conductivity b) specific heat c) coefficient of linear thermal expansion d) thermal shock
3. Explain the working principle of thermocouple along with its applications.