

ANURAG GROUP OF INSTITUTIONS

(Autonomous)

School of Engineering

I-B.Tech-I-Semester

II Assignment Questions

Subject: APPLIED PHYSICS

1. A rectangular block of a solid is connected to a DC voltage source. Obtain the expression
 - a) For the current density flowing through the block and
 - b) For the conductivity of the material in terms of the concentration of carriers in it.
2. Derive an expression for the density of energy states in a solid material.
3. Elucidate the difference between classical free electron theory and quantum free electron theory.
4. Explain the Kronig-Penny model of solids and show that it leads to energy band structure of solids.
5. Explain energy band diagram of silicon showing a graph of variation of potential energy with distance. Explain semiconducting nature of silicon. With similar band structure why is diamond insulator.
6. Derive an expression for carrier concentration of electrons and holes in intrinsic semiconductor and show that the Fermi level in an intrinsic semiconductor lies in the middle of the energy gap.
7. Draw energy bands for a) Intrinsic semiconductor b) N- type semiconductor c) P- type semiconductor.
8. a) The intrinsic carrier density at room temperature in Ge is $2.37 \times 10^{19}/\text{m}^3$. If the electron and hole mobilities are 0.38 and $0.18 \text{m}^2\text{V}^{-1}\text{s}^{-1}$ respectively. Calculate the resistivity.
b). Find the temperature at which 1% probability of electrons in a state with energy 0.5eV above Fermi energy.