LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
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FRESHMAN ENGINEERING DEPARTMENT

Assignment

UNIT V SEMICONDUCTORS

1	Derive an equation for the conductivity in intrinsic semiconductor.
2	Explain the drift and diffusion currents in a semiconductor and deduce Einstein's relations.
3	Define Fermi level. Explain the Fermi level in intrinsic semiconductor.
4	State and explain Hall effect and find the Hall coefficient.
5	Derive the conductivity in P-Type semiconductor.
6	Derive the conductivity in N-Type semiconductor.
7	Discuss the energy band formation in solids
8	Classify the materials based on energy gap.

Problems

1	The intrinsic carrier density at room temperature i Ge $2.37 \times 10^{19}/m^3$.If the electron and hole mobilities are 0.38 and $0.18 m^2 V^{-1} s^{-1}$ respectively, estimate the conductivity and resistivity.
2	For an intrinsic semiconductor with gap width 0.7 eV.Calculate the carrier concentration of intrinsic semiconductor at 300 K assuming that mass of electron is equal to the mass of a hole.
3	The following data are given for intrinsic Ge at 300 K. $n_i = 2.4 \times 10^{19}\ /m^3$, $\mu_e = 0.39 \times m^2\ V^{-1} S^{-1}$, $\mu_p = 0.19\ m^2\ V^{-1} S^{-1}$ Estimate the resistivity of the sample.
4	Find the diffusion coefficient of electrons in Silicon at 300 K if $\mu_e = 0.19\ m^2\ V^{-1} S^{-1}$
5	The Hall coefficient of certain silicon specimen was found to be $-7.35 \times 10^{-5}\ /m^3\ /C$ from 100 to 400 K. Determine the nature of the semiconductor. If the conductivity was found to be 200/m/Ω.. Estimate the density and mobility of the charge carrier.

6	A silicon plate of thickness 1mm, breadth 10mm and length 100mm is placed in a magnetic field of $0.5\ wb/m^2$ acting perpendicular to its thickness. If $10^{-2}\ A$ current flows along its length,calculate the Hall voltage developed if the Hall coefficient is $3.66 \times 10^{-4}\ m^3/C$.

Constants:

Mass of electron $= 9.1 \times 10^{-31}\ kg$

Planck's constant $= 6.626 \times 10^{-34} Js$

Charge of electron $= 1.6 \times 10^{-19} C$

$$1\ eV = 1.6 \times 10^{-19} J$$

Boltzmann's constant $= 1.38 \times 10^{-23}$