



Indian Institute of Information Technology, Design and Manufacturing, Kancheepuram

Quiz I Exam, Jul - Nov 2023

Course Code: EC2000

Course Title: Solid State Electronic Devices

Date of Examination: 28/08/2023

Category: Core

Duration: 1 hour (1.30 -2.30 PM)

Max. Marks: 15 marks

Answer any three of the following:

(3x5 = 15 marks)

1. Draw the band diagram, density of states, Fermi–Dirac distribution, and the carrier concentrations for (a) intrinsic, (b) n-type, and (c) p-type semiconductors at thermal equilibrium.
2. Calculate the probability that a quantum state in the conduction band at $E = E_c + kT/2$ is occupied by an electron, and calculate the thermal-equilibrium electron concentration in silicon at $T = 300\text{K}$. Assume the Fermi energy is 0.25 eV below the conduction band. The value of N_c for silicon at $T = 300\text{ K}$ is $N_c = 2.8 \times 10^{19} \text{ cm}^{-3}$. Note: $kT=0.0259$.
3. (a) Derive and discuss the equations governing the intrinsic carrier concentration.
(b) In many semiconductors, atoms are arranged in a basic diamond structure but are different on alternating sites called structure which is typical of compounds.
4. Explain in detail about the elemental and compound semiconductors along with their uses.

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