DPP 01

SOLUTION

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1. The temperature co-efficient of resistance of a semiconductor is always negative.

2. At 0. kelvin

define fermi energy Level.

3. Resistance of semiconductor $\propto \frac{1}{\text{Temperature}}$

4. At room temperature, the valence band is partially empty and the conduction band is partially filled.

5. Because electrons needed less energy to move.

6. $\lambda_{max} = \frac{hc}{E} = \frac{6.6\times10^{-34}\times3\times10^{8}}{1.14\times1.6\times10^{-19}} = 10888\text{Å}$

7. In N-type semiconductor, free electrons are the majority charge carries.

8. Al mixed in Si or B mixed in Ge.

9. $\text{Ge} + \begin{matrix}\text{Trivalent}\\ \text{impurity}\end{matrix} \Rightarrow \begin{matrix}\text{P}-\text{type}\\ \text{semiconductor}\end{matrix}$

10. Number density of atoms in silicon specimen $= 5\times10^{22}$ atom $/\text{cm}^3$ indium atoms doped per cm^3 of silicon.

$$n = \frac{5\times10^{22}}{5\times10^{7}} = 1\times10^{15}\ \text{atom}/\text{cm}^3$$

11. $n_e h_h \approx n^2$

$$\text{or}\ \ h_e = \frac{n^2}{n_h} = \frac{10^{16}\times10^{16}}{4.5\times10^{22}} = \frac{10^{32}}{4.5\times10^{22}}\ \text{m}^{-3}$$

12. $E = \frac{hc}{\lambda} \Rightarrow \lambda = \frac{hc}{E}$

$$= \frac{6.6\times10^{-34}\times3\times10^{8}}{57\times10^{-3}\times1.6\times10^{-19}} = 217100\text{Å}$$