

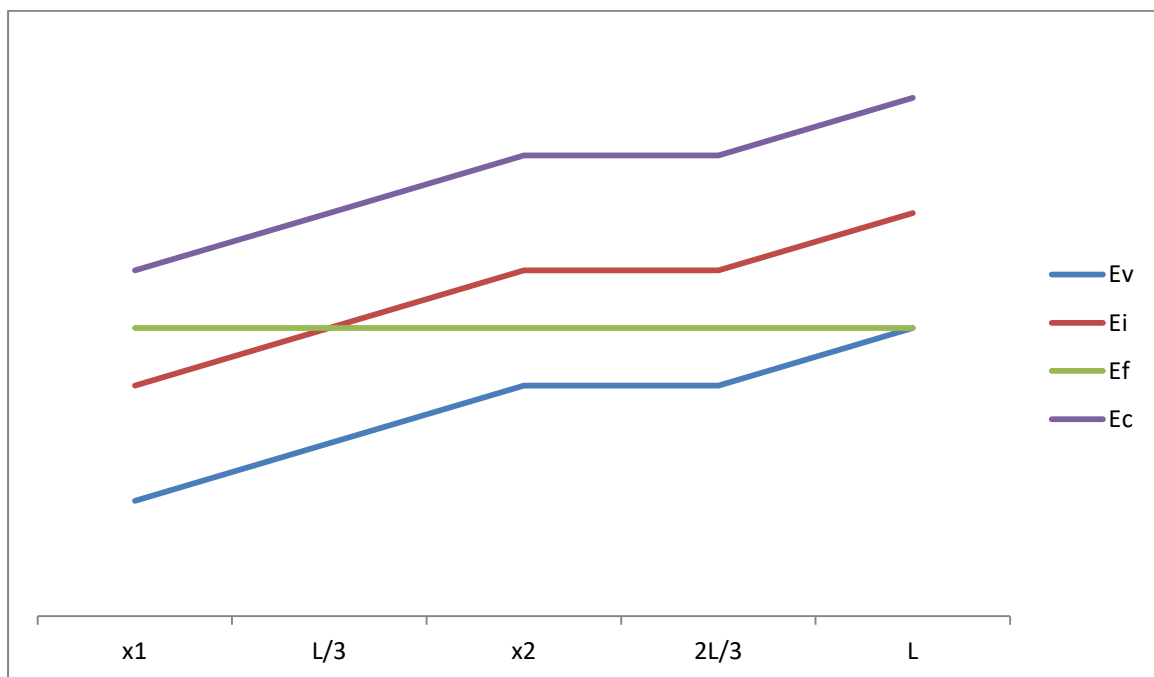
Note : Attempt All question

1: (a) Si sample is doped with 10 boron atoms per cm^3 . What are the carrier concentrations in the sample at 300K?

(b) In a particular semiconductor, the probability of electrons occupying states at an energy kT above the

Bottom of the conduction band is e^{-7} . Determine the position of the Fermi level in the given material.

(ii) Derive an expression for the relation of electric field and the energy band ($E_c/E_v/E_i$).



2: A

silicon device maintained at 300K is characterized by the following Energy band diagram. Use the cited energy band diagram in answering the following question. Where, E_g is the band gap of the semiconductor?

(i) Sketch the electrostatic potential (ψ) inside the semiconductor (ii) Sketch the electric field (E).

(iii) Does the equilibrium condition prevail? (iv) At $x=x_2$, $p=?$ (v) What is the hole drift current density (j_p , drift)

Flowing at $x=x_1$.

3: (a) Derive an expression for Einstein Relationship.

(b) AP-N junction has $N_a=1 \times 10^{16} \text{ cm}^{-3}$ and $N_d=1 \times 10^{16} \text{ cm}^{-3}$. $T=300 \text{ K}$

(c) Calculate the built in potential. (ii) Calculate the depletion layer width (W_{ep}).

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