Advanced · Qn. 2.

$n_0 = 10^{16}$. $G_1 = 10^{19}$ $\tau_n = \tau_p = 10 \times 10^{-6}$. $n_i = 10^{14}$ at 450k .

$$\Delta p = 10^{19} \times 10 \times 10^{-6} = 10^{14}$$

$$p_0 = \frac{10^{28}}{10^{16}} = 10^{12} \Rightarrow p_0 + \Delta p = p = 10^{14} .$$

$$E_i - F_p = kT \ln\left(\frac{10^{14}}{10^{14}}\right)$$

$$= 0.0256 \times \frac{450}{300} \Rightarrow E_i = F_p .$$

$$F_n - E_i = kT \ln \frac{10^{16}}{10^{14}} = 0.0256 \times \frac{450}{300} \times 4.605$$

$$= 0.1768 .$$