

Gabarito teste 10 - 2º semestre de 2023

Versão 1

$$p_{p0} = NA = 10^{16} \text{ cm}^{-3}$$

$$n_{p0} = ni^2 / NA = 10^4 \text{ cm}^{-3}$$

$$p_{n0} = ni^2 / ND = 10^3 \text{ cm}^{-3}$$

$$n_{no} = ND = 10^{17} \text{ cm}^{-3}$$

$$V_0 = V_T \cdot \ln(NA \cdot ND / ni^2) = V_T \cdot \ln(10^{33} / 10^{20}) = V_T \cdot \ln((10^4)^{13}) = V_T \cdot 13 \cdot 2,3 = 747,5 \text{ mV}$$

$$W = \sqrt{\frac{2 \cdot \epsilon_s}{q} \cdot \left(\frac{1}{NA} \cdot \frac{1}{ND} \right) \cdot V_0} = \sqrt{\frac{2 \cdot 10^{-12}}{1,6 \cdot 10^{-19}} \cdot 10^{-16} \cdot 0,7475} = 0,320 \mu\text{m}$$

$$xn = \frac{NA}{ND} \cdot (W - xn) = 0,029 \mu\text{m}$$

$$xp = W - xn = 0,290 \mu\text{m}$$

Versão 2

$$p_{p0} = NA = 10^{17} \text{ cm}^{-3}$$

$$n_{p0} = ni^2 / NA = 10^3 \text{ cm}^{-3}$$

$$p_{n0} = ni^2 / ND = 10^4 \text{ cm}^{-3}$$

$$n_{no} = ND = 10^{16} \text{ cm}^{-3}$$

$$V_0 = V_T \cdot \ln(NA \cdot ND / ni^2) = V_T \cdot \ln(10^{33} / 10^{20}) = V_T \cdot \ln((10^4)^{13}) = V_T \cdot 13 \cdot 2,3 = 747,5 \text{ mV}$$

$$W = \sqrt{\frac{2 \cdot \epsilon_s}{q} \cdot \left(\frac{1}{NA} \cdot \frac{1}{ND} \right) \cdot V_0} = \sqrt{\frac{2 \cdot 10^{-12}}{1,6 \cdot 10^{-19}} \cdot 10^{-16} \cdot 0,7475} = 0,320 \mu\text{m}$$

$$xn = \frac{NA}{ND} \cdot (W - xn) = 0,290 \mu\text{m}$$

$$xp = W - xn = 0,029 \mu\text{m}$$