

Download File PDF Semiconductor Physics And Devices Basic Principles 4th Edition Solution Manual

#Jenny



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#Rio



Cool! I'am really happy

#Markus Jensen



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#Diego Butler



so many fake sites. this is the first one which worked! Many thanks

Semiconductor Physics and Devices: Basic Principles, 4th Edition
Chapter 6
Solutions Manual
Problem Solutions

$p_1 = N_1 \exp\left[-\frac{E_c - E_f}{kT}\right]$
 Apply the same logic:
 $E_c - E_f = (E_c - E_i) + (E_i - E_f)$
 $E_c - E_f = 3kT, E_i - E_f = 0.045 eV$
 Then
 $p_1 = (1.04 \times 10^{19}) \exp\left[-\frac{0.045}{0.0259}\right]$
 $= (1.04 \times 10^{19}) \exp(-1.737)$
 or
 $p_1 = 9.12 \times 10^{16} \text{ cm}^{-3}$
 (b) Same. Assume $E_i - E_f = 0.0595 eV$
 Then
 $p_1 = (1.04 \times 10^{19}) \exp\left[-\frac{0.0595}{0.0259}\right]$
 $= (1.04 \times 10^{19}) \exp(-2.302)$
 or
 $p_1 = 9.26 \times 10^{16} \text{ cm}^{-3}$

4.28
Computer Plot
4.29
 (a) Eq.
 $p_1 = \frac{N_1 - N_2}{2} \sqrt{\left(\frac{N_1 - N_2}{2}\right)^2 + n^2}$
 Then
 $p_1 = \frac{10^{19}}{2} \sqrt{\left(\frac{10^{19}}{2}\right)^2 + (2.4 \times 10^{17})^2}$
 or
 $p_1 = 2.91 \times 10^{17} \text{ cm}^{-3}$

$n_1 = n^2 \frac{(2.4 \times 10^{17})^2}{2.91 \times 10^{17}}$
 $n_1 = 1.91 \times 10^{17} \text{ cm}^{-3}$
 (b)
 $n_1 = \frac{N_1 - N_2}{2} \sqrt{\left(\frac{N_1 - N_2}{2}\right)^2 + n^2}$
 Then
 $n_1 = \frac{10^{19}}{2} \sqrt{\left(\frac{10^{19}}{2}\right)^2 + (2.4 \times 10^{17})^2}$
 or
 $n_1 = 5.10 \times 10^{17} \text{ cm}^{-3}$
 and
 $p_1 = \frac{(2.4 \times 10^{17})^2}{5.10 \times 10^{17}}$
 $p_1 = 1.15 \times 10^{17} \text{ cm}^{-3}$

4.30
 For the donor level
 $\frac{N_D}{N_1} = \frac{1}{1 + 2 \exp\left(\frac{E_D - E_f}{kT}\right)}$
 $n = \frac{1}{2} \left[\frac{N_D}{N_1} + \sqrt{\left(\frac{N_D}{N_1}\right)^2 + 4n_i^2} \right]$
 or
 $\frac{N_D}{N_1} = 2.05 \times 10^4$
 And
 $f_1(E) = \frac{1}{1 + \exp\left(\frac{E - E_f}{kT}\right)}$
 Now
 $E - E_f = (E - E_c) + (E_c - E_f)$
 or
 $E - E_f = 0.17 + 0.240$
 Then
 $f_1(E) = \frac{1}{1 + \exp\left(\frac{0.410}{0.0259}\right)}$
 $f_1(E) = 2.87 \times 10^{-8}$

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