

Fundamentals of Nanotransistors

L2.1 Quiz

ANSWERS

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Lecture 2.1: Introduction (band bending in MOS capacitors)

- 1) If the energy bands of the semiconductor part of an MOS capacitor in equilibrium bend **down** at the surface, which of the follow is **not** true?
 - a) The electrostatic potential at the surface is more positive than in the bulk.
 - b) The electric field near the surface points from the surface to the bulk.
 - c) The electron density near the surface is larger than in the bulk.
 - d) The hole density near the surface is smaller than in the bulk.
 - e) **The Fermi level bends down near the surface.**

- 2) Consider a MOS capacitor with an n-type semiconductor in **accumulation**. Which of the following is true? HINT: $\psi_B < 0$ for an n-type semiconductor.
 - a) **$\psi_S > 0$.**
 - b) $\psi_S = 0$.
 - c) $\psi_S < 0$.
 - d) $\psi_S < \psi_B$.
 - e) $\psi_S < 2\psi_B$.

- 3) Consider an MOS capacitor with an n-type semiconductor in **inversion**. Which of the following is true? HINT: $\psi_B < 0$ for an n-type semiconductor.
 - a) $\psi_S > 0$.
 - b) $\psi_S = 0$.
 - c) $\psi_S < 0$.
 - d) $\psi_S < \psi_B$.
 - e) **$\psi_S < 2\psi_B$.**