

Fundamentals of Nanotransistors

L2.5 Quiz

ANSWERS

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Lecture 2.5: Mobile Charge: Bulk MOS

- 1) Which of the following is true about the mobile electron charge in C/cm^2 in a p-type bulk semiconductor?
 - a) There is no mobile charge for $\mathcal{V}_S < 2\mathcal{V}_B$.
 - b) The mobile charge varies as $e^{q\mathcal{V}_S/k_B T}$ below and above threshold.
 - c) The mobile charge varies as $e^{q\mathcal{V}_S/2k_B T}$ below and above threshold.
 - d) The mobile charge varies as $e^{q\mathcal{V}_S/k_B T}$ below threshold and as $e^{q\mathcal{V}_S/2k_B T}$ above threshold.
 - e) The mobile charge varies as $e^{q\mathcal{V}_S/k_B T}$ below threshold and as $e^{q\mathcal{V}_S/2k_B T}$ above threshold.**

- 2) Which of the following is true about the mobile electron charge in C/cm^2 in a p-type semiconductor?
 - a) There is no mobile charge for $V_G < V_T$.
 - b) The mobile charge varies as $e^{qV_G/k_B T}$ below and above threshold.
 - c) The mobile charge varies as $e^{qV_G/mk_B T}$ below and above threshold.
 - d) The mobile charge varies as $e^{qV_G/mk_B T}$ below threshold and as $(V_G - V_T)$ above threshold.**
 - e) The mobile charge varies as $(V_G - V_T)$ below threshold and as $e^{qV_G/mk_B T}$ above threshold.

- 3) What important effect does the finite semiconductor capacitance have in strong inversion (as compared to the case of an infinite semiconductor capacitance)?
 - a) It increases the mobile charge in the inversion layer.
 - b) It causes the gate capacitance to be less than the oxide capacitance.**
 - c) It causes the gate capacitance to be more than the oxide capacitance.
 - d) It increases the maximum width of the depletion layer, W_T .
 - e) It decreases the maximum width of the depletion layer, W_T .