

Fundamentals of Nanotransistors

L2.6 Quiz

ANSWERS

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Lecture 2.6: Mobile Charge: ETSOI

- 1) Which of the following statements is true for a fully depleted, double gate ETSOI MOS capacitor in depletion?
 - a) $m = 1$.
 - b) $m < 1$.
 - c) $m = 2$.
 - d) The formula $m = 1 + C_D / C_{ox}$ for a bulk MOS-C becomes $m = 1 + (e_{Si} / t_{Si}) / C_{ox}$ where e_{Si} is the dielectric constant of silicon and t_{Si} is the thickness of the silicon layer.
 - e) The formula $m = 1 + C_D / C_{ox}$ for a bulk MOS-C becomes $m = 1 + 2(e_{Si} / t_{Si}) / C_{ox}$ where e_{Si} is the dielectric constant of silicon and t_{Si} is the thickness of the silicon layer.

- 2) Which of the following is true about the mobile electron charge in C/cm² in a fully depleted, double gate ETSOI MOS capacitor in depletion?
 - 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 $e^{q\mathcal{V}_S/2k_B T}$ below threshold and as $e^{q\mathcal{V}_S/k_B T}$ 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.

- 3) Which of the following is true about the mobile electron charge in C/cm² in a fully depleted, double gate, ETSOI structure.
 - 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 $(V_G - V_T)$ below and above threshold.
 - d) The mobile charge varies as $e^{qV_G/k_B T}$ 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.