Assignment 8

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. Due on 2018-09-26, 23:59 IST.

1) An ideal N-MOS capacitor is subjected to a C-V measurement with a very fast DC sweep and a high frequency small signal. Which of the following C-V characteristics will it exhibit?

- None of the above
- None of the above
- None of the above
- None of the above

No, the answer is incorrect.
Score: 0

1 point
3) A MOS capacitor is biased such that the majority carriers pile up at the oxide-semiconductor interface. Which mode is the MOS capacitor operating?

- strong inversion
- weak inversion
- depletion
- accumulation

No, the answer is incorrect.
Score: 0
Accepted Answers: 41 nm

4) Consider a MOS-capacitor with p-type silicon substrate at \( T = 300 \text{K} \) doped to \( N_A = 1 \times 10^{16} / \text{cm}^2 \). The oxide is silicon dioxide with a thickness of 55 nm. The area of the device is \( 2 \times 10^{-3} \text{cm}^2 \). Assume thermal voltage is 25.9 mV and \( n_i = 1.5 \times 10^{10} / \text{cc} \). Calculate the value of total oxide capacitance of the device in picofarads.

- 126 pF
- 62.8 pF
- 628 pF
- 12.6 pF

No, the answer is incorrect.
Score: 0
Accepted Answers: 126 pF

5) For the MOS-capacitor given in question (4), calculate the value of maximum depletion width \( x_d \).

- 27 \( \mu \text{m} \)
- 9 \( \mu \text{m} \)
- 3 \( \mu \text{m} \)
- 0.3 \( \mu \text{m} \)

No, the answer is incorrect.
Score: 0
Accepted Answers: 0.3 \( \mu \text{m} \)

6) For the MOS-capacitor given in question (4), calculate the value of effective
For a MOS-capacitor biased in accumulation mode, the effective capacitance is:

None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
2.23 \times 10^{-8} \text{ F/cm}^2

7) For a MOS-capacitor biased in accumulation mode, the effective capacitance is:

None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
2.23 \times 10^{-8} \text{ F/cm}^2

8) Consider the following statements:

For a MOS capacitor with gate voltage equal to the threshold voltage,

i. The surface potential is equal to twice the value of \( \phi_F \)
ii. There is no band-bending in the semiconductor
iii. The inversion charge concentration at the interface matches the majority carrier concentration in the bulk
iv. The surface potential is equal to \( \phi_F \)

Which of the above statements are false?

iv only

No, the answer is incorrect.
Score: 0
Accepted Answers:

9) For a MOS-capacitor under strong inversion, the surface charge density:
Consider a MOS capacitor with p-type silicon substrate at $T=300K$ doped to $N_A = 1 \times 10^{14} \text{/cc}$. The oxide is silicon dioxide with a thickness of 50nm. Let $\phi_{MS} = -0.83V$. Assume $n_i = 1.5 \times 10^{10} \text{/cc}$ and thermal voltage is 25.9mV. Calculate the threshold voltage of the MOS capacitor.

- 0.32 V
- 0.8 V
- 0.77 V
- 0.13 V

No, the answer is incorrect. 
Score: 0
Accepted Answers:
- 0.32 V