

Fundamentals of Nanotransistors

L2.2 Quiz

ANSWERS

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Lecture 2.2: The Depletion Approximation

1) How does the width of the depletion region vary with surface potential?

a) As $|\psi_s|$.

b) As $|\psi_s|^{1/2}$.

c) As $|\psi_s|^0$.

d) As $|\psi_s|^{-1/2}$.

e) As $|\psi_s|^{-1}$.

2) If W_D is the width of the depletion layer in a p-type semiconductor, what is $-qN_A W_D$?

a) The mobile charge per unit area in the oxide.

b) The fixed charge at per unit area the oxide-semiconductor interface.

c) The charge per unit area in the depletion region due to mobile electrons.

d) The charge per unit area in the depletion region due to the ionized acceptors.

e) The charge per unit area in the depletion region due to both ionized acceptors and mobile electrons.

3) For a depleted p-type semiconductor, how does the magnitude of the electric field at the surface vary with doping density, N_A at a fixed ψ_s ?

a) As N_A .

b) As $\sqrt{N_A}$.

c) As $1/\sqrt{N_A}$.

d) As $1/N_A$.

e) As $1/N_A^2$.