

Fundamentals of Nanotransistors

L3.4 Quiz

ANSWERS

Mark Lundstrom

Purdue University

Lecture 3.4: The ballistic MOSFET

- 1) The quantity, $\sqrt{2k_B T / pm^*}$, plays an important role in our discussions. What is it?
- a) The rms thermal velocity for nondegenerate conditions.
 - b) The rms thermal velocity for degenerate conditions.
 - c) The unidirectional thermal velocity for nondegenerate conditions.**
 - d) The unidirectional thermal velocity for degenerate conditions.
 - e) The ballistic injection velocity for degenerate conditions.
- 2) Which of the following best describes the transmission in the ballistic limit?
- a) $\mathcal{T}(E) = I(E) / (I(E) + L)$
 - b) $\mathcal{T}(E) = I(E) / L$
 - c) $\mathcal{T}(E) \rightarrow 1$**
 - d) $\mathcal{T}(E) \rightarrow 0$
 - e) $\mathcal{T}(E) = 0.5$
- 3) How are the states at the top of the barrier (the virtual source) occupied in a **ballistic** MOSFET under on-current conditions?
- a) Equally by electrons injected from the source and from the drain.
 - b) Mostly by positive velocity electrons injected from the source.**
 - c) Mostly by negative velocity by electrons injected from the source.
 - d) Both positive velocity and negative velocity states are occupied by electrons injected from the source.
 - e) Only negative velocity states are occupied by electrons injected from the drain.
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