

Fundamentals of Nanotransistors

L3.5 Quiz

ANSWERS

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Lecture 3.5: The Ballistic Injection Velocity

- 1) How does the ballistic injection velocity vary with gate bias?
 - a) It is independent of gate bias for nondegenerate statistics.
 - b) It increases with gate bias when Fermi-Dirac statistics are treated.
 - c) It is $\sqrt{2k_B T / pm^*}$ for a nondegenerate semiconductor.
 - d) All of the above.**
 - e) None of the above.

- 2) In a well-designed MOSFET, how does the magnitude of the inversion layer charge vary with drain voltage?
 - a) It increases with drain voltage for non-degenerate conditions.
 - b) It increases with drain voltage when Fermi-Dirac statistics are included.
 - c) It increases most with drain voltage when $V_{DS} > V_{SAT}$.
 - d) All of the above.
 - e) None of the above.**

- 3) What is the quantity $u_T L / [2(k_B T / q)]$?
 - a) The ballistic injection velocity.
 - b) The ballistic injection velocity for nondegenerate conditions.
 - c) The ballistic mobility.**
 - d) The ballistic mobility for nondegenerate conditions.
 - e) The ballistic on-current for nondegenerate conditions.