Fundamentals of Nanotransistors

L4.4 Quiz

ANSWERS

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Lecture 4.4: Transmission Theory of the MOSFET: I

1) How does the transmission vary with drain bias?

a) It increases as V_{DS} increases from 0 to V_{DD}.

b) It decreases as V_{DS} increases from 0 to V_{DD}.

c) It reaches a maximum for V_{DS} between 0 V and V_{DD}.

d) It reaches a minimum for V_{DS} between 0 V and V_{DD}.

e) It is independent of V_{DS}.

2) How is the linear region current in the presence of scattering, I_{DLIN}, related to the ballistic linear region current, I_{DLIN}^{ball}?

a) $I_{DLIN} = \mathcal{T}_{LIN} I_{DLIN}^{ball}$.

b) $I_{DLIN} = \left(\dfrac{\mathcal{T}_{LIN}}{2 - \mathcal{T}_{LIN}} \right) I_{DLIN}^{ball}$.

c) $I_{DLIN} = \left(\dfrac{\mathcal{T}_{LIN}}{1 + \mathcal{T}_{LIN}} \right) I_{DLIN}^{ball}$.

d) $I_{DLIN} = \left(\dfrac{\mathcal{T}_{LIN}}{2 + \mathcal{T}_{LIN}} \right) I_{DLIN}^{ball}$.

e) $I_{DLIN} = \left(\mathcal{T}_{LIN} \left(2 - \mathcal{T}_{LIN} \right) \right) I_{DLIN}^{ball}$.

3) How is the saturation region current in the presence of scattering, I_{DSAT}, related to the saturation region current, I_{SAT}^{ball}?

a) $I_{DSAT} = \mathcal{T}_{SAT} I_{DSAT}^{ball}$.

b) $I_{DSAT} = \left(\dfrac{\mathcal{T}_{SAT}}{2 - \mathcal{T}_{SAT}} \right) I_{DSAT}^{ball}$.

c) $I_{DSAT} = \left(\dfrac{\mathcal{T}_{SAT}}{1 + \mathcal{T}_{SAT}} \right) I_{DSAT}^{ball}$.

d) $I_{DSAT} = \left(\dfrac{\mathcal{T}_{SAT}}{2 + \mathcal{T}_{SAT}} \right) I_{DSAT}^{ball}$.

e) $I_{DSAT} = \left(\mathcal{T}_{SAT} \left(2 - \mathcal{T}_{SAT} \right) \right) I_{DSAT}^{ball}$.