MOSFET

Total Points: 40 | Questions: 4 | Date: February 19, 2026

AI-generated graduate-level electrical assignment. Contains 4 questions covering key concepts.

Question 1

10.0 points

Explain how the threshold voltage affects the drain current in a MOSFET, and how it is influenced by substrate bias in the diagram below.

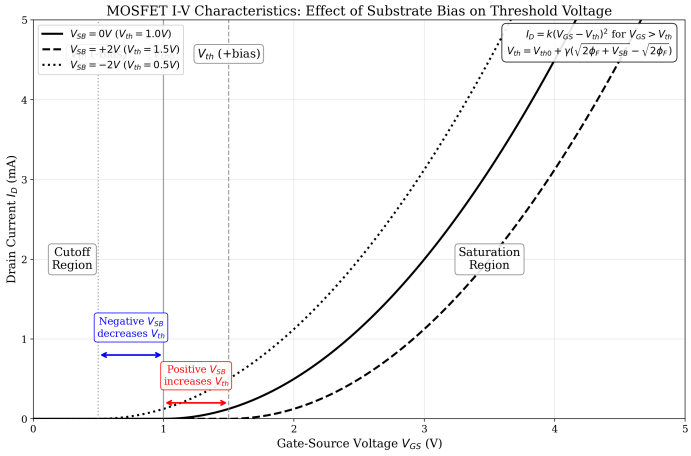

Fig. 1. Circuit diagram for Question 1

Question 2

10.0 points

For the MOSFET circuit shown below, calculate the drain current if the MOSFET operates with a gate-to-source voltage of 3V, a threshold voltage of 1V, and a drain-to-source voltage of 4V, assuming it is in saturation with a transconductance parameter of 300 μA/V².

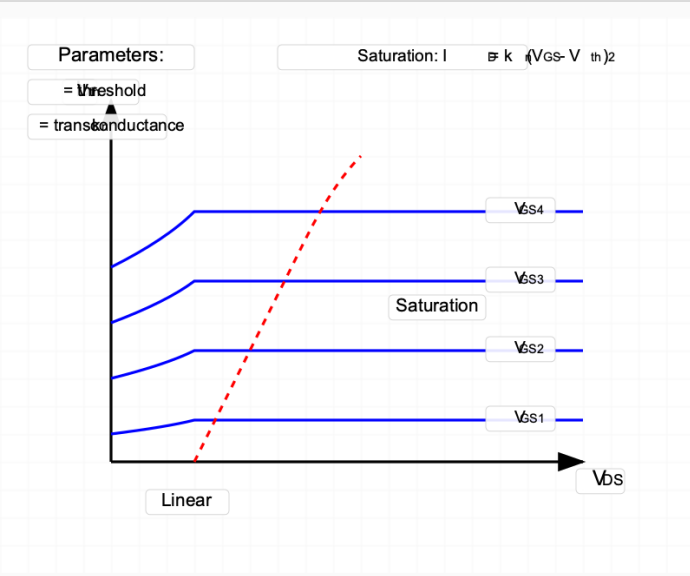

Fig. 2. Circuit diagram for Question 2

Question 3

10.0 points

Describe how a MOSFET is used as a switch in digital circuits, using the circuit shown below to provide an example illustrating its ON and OFF states with voltage levels.

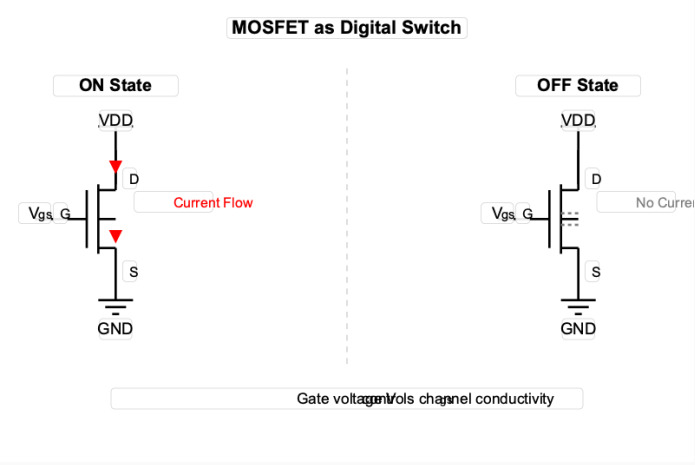

Fig. 3. Circuit diagram for Question 3

Question 4

10.0 points

For the NMOS transistor shown in the diagram below, the drain current is measured at different drain-to-source voltages. Calculate the channel length modulation parameter (λ) if the change in drain current is from 10 mA to 10.5 mA when the drain-source voltage changes from 5V to 5.5V, with V_{gs} constant at 3V and V_t at 1V.

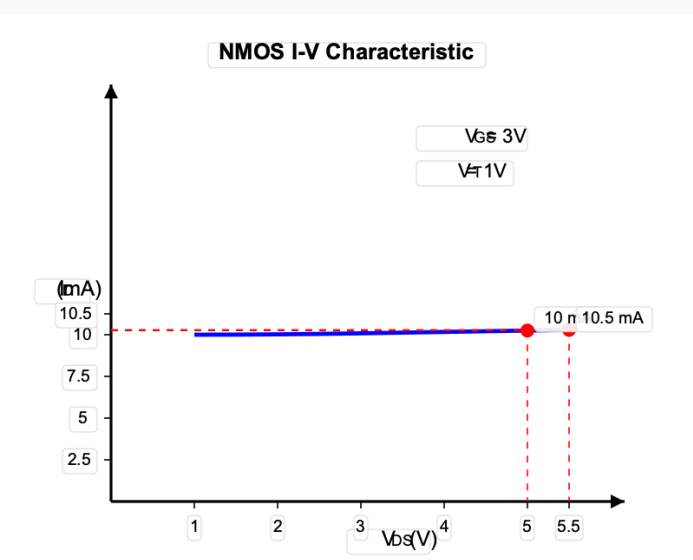

Fig. 4. Circuit diagram for Question 4