RAMA UNIVERSITY

www.ramauniversity.ac.in

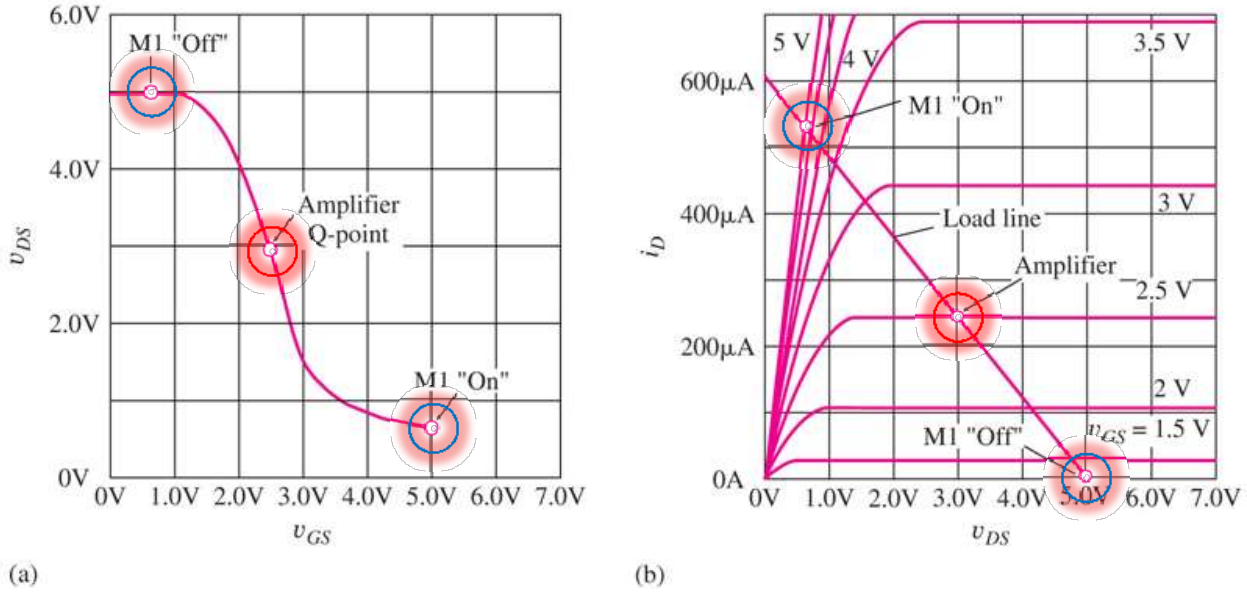
FACULTY OF ENGINEERING AND TECHNOLOGY

MEC-022

Lecture - 12

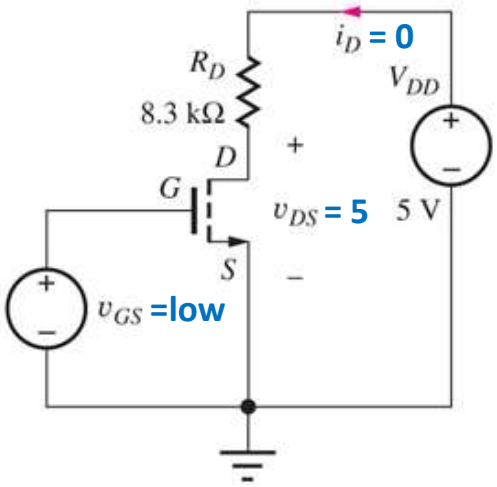
MOSFET Analysis

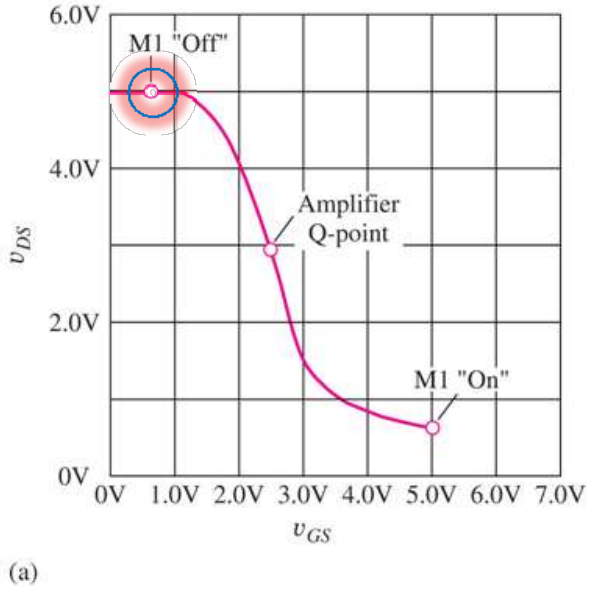
- Depending on the type of application, a MOSFET may be put into one of three regions of operation by setting its operating **Q-point**.
- For **binary logic** application the transistor acts like an “on-off” switch and the Q-point is set in ether cut-off region (“off”) or in the triode region (“on”) for the output characteristic or at the ends of transfer characteristic.
- For amplifier application, the Q-point is set in the saturation region for the output characteristic or in the middle (high) point of the transfer characteristic

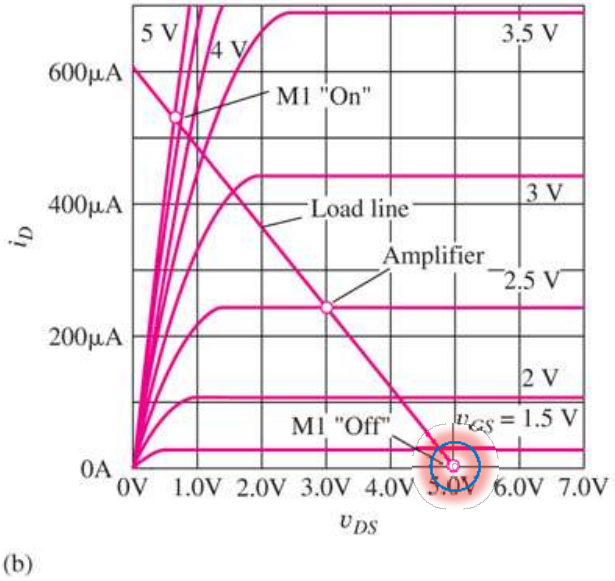


MOSFET Analysis: logic inverter example

- For the **low** values of input v_{GS} (binary 0) the MOSFET is **off, i_D =0** and **v_{DS} = v_{out} = 5V** → binary 1.

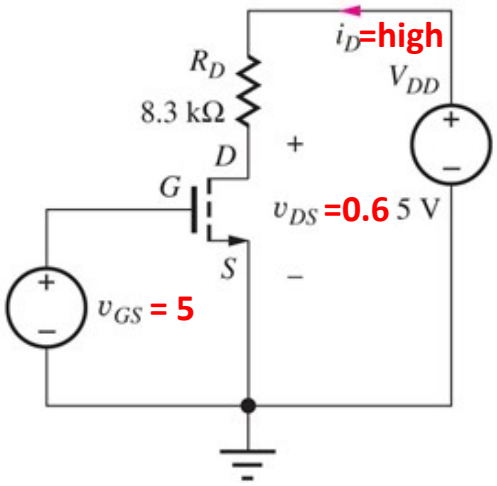


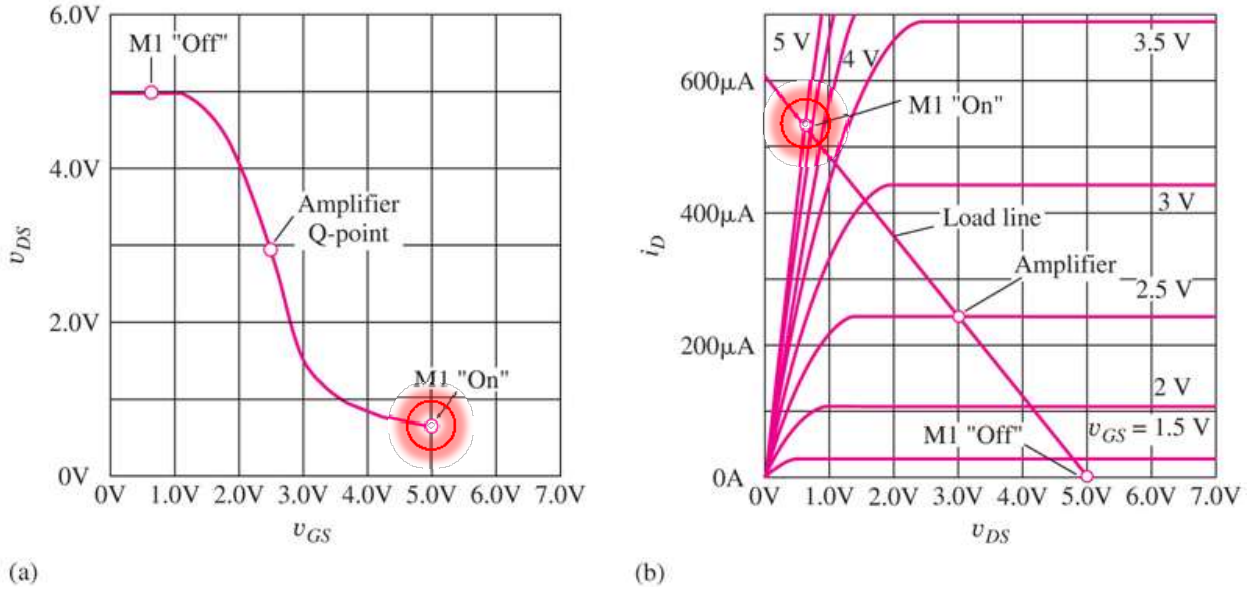




MOSFET Analysis: logic inverter example

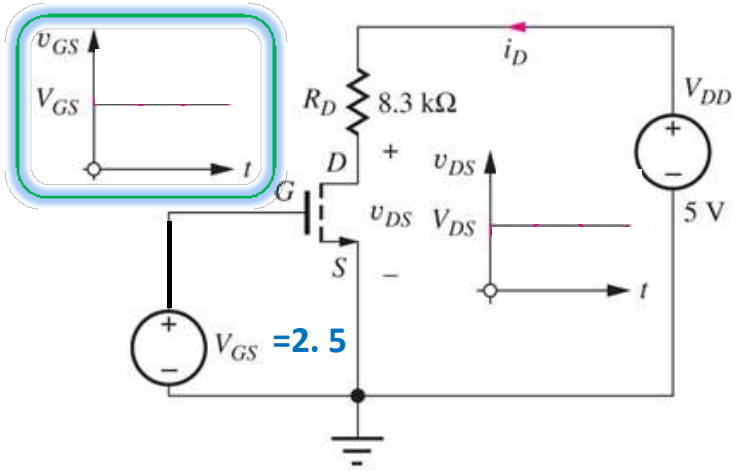
- For v_{GS} =5V (binary 1) the MOSFET is **on**, i_D **is high**, and the output voltage $v_{DS} = v_{out}$ = 0.65V → binary 0.

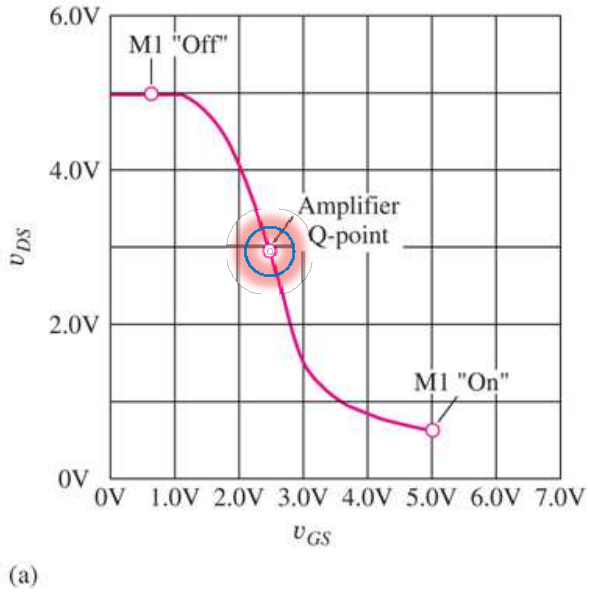


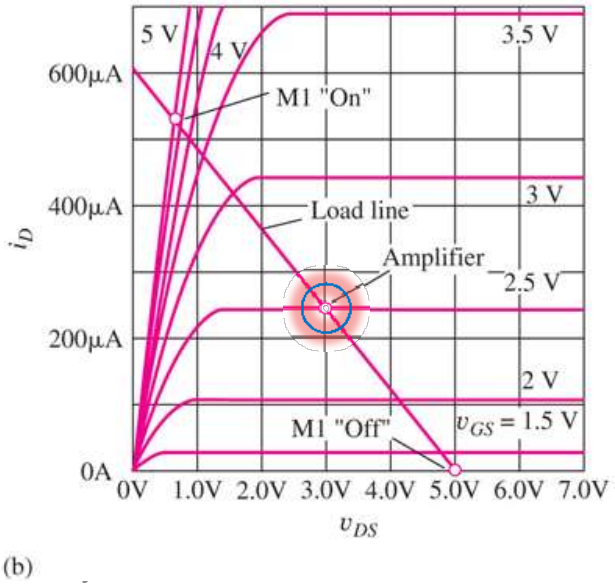


MOSFET Analysis: amplifier example

- For the amplifier, the Q-point created by v_{GS} = 2.5V is located at the high slope region of transfer characteristic and at the saturation region of the 2.5V curve.







Thank You!