

Lecture : 9

Requirements for a Logic Device

From text book:

Nanoelectronics and Information Technology pp324-7

Information Processing.

- Information processing in physical world requires logical states must be mapped onto physical properties
 - Mapped onto amplitude of physical properties
 - voltage, current, timing of pulse

Key Requirements of a Logic Device

???

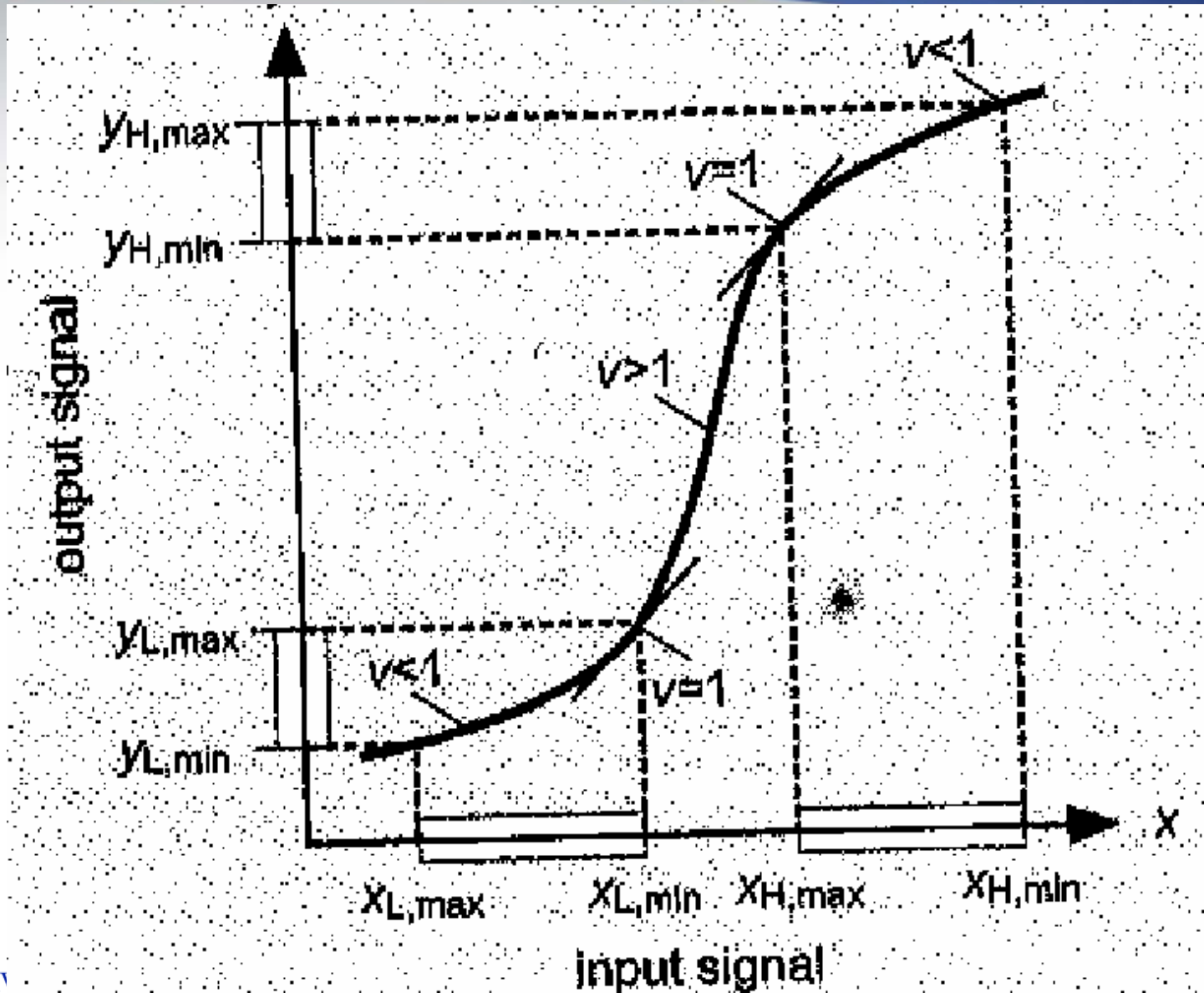
Highly Desirable Requirements Just to be “Usable”

- Non-linear characteristics
- Power amplification
- Concatenability
- Feedback prevention
- Basic Logic

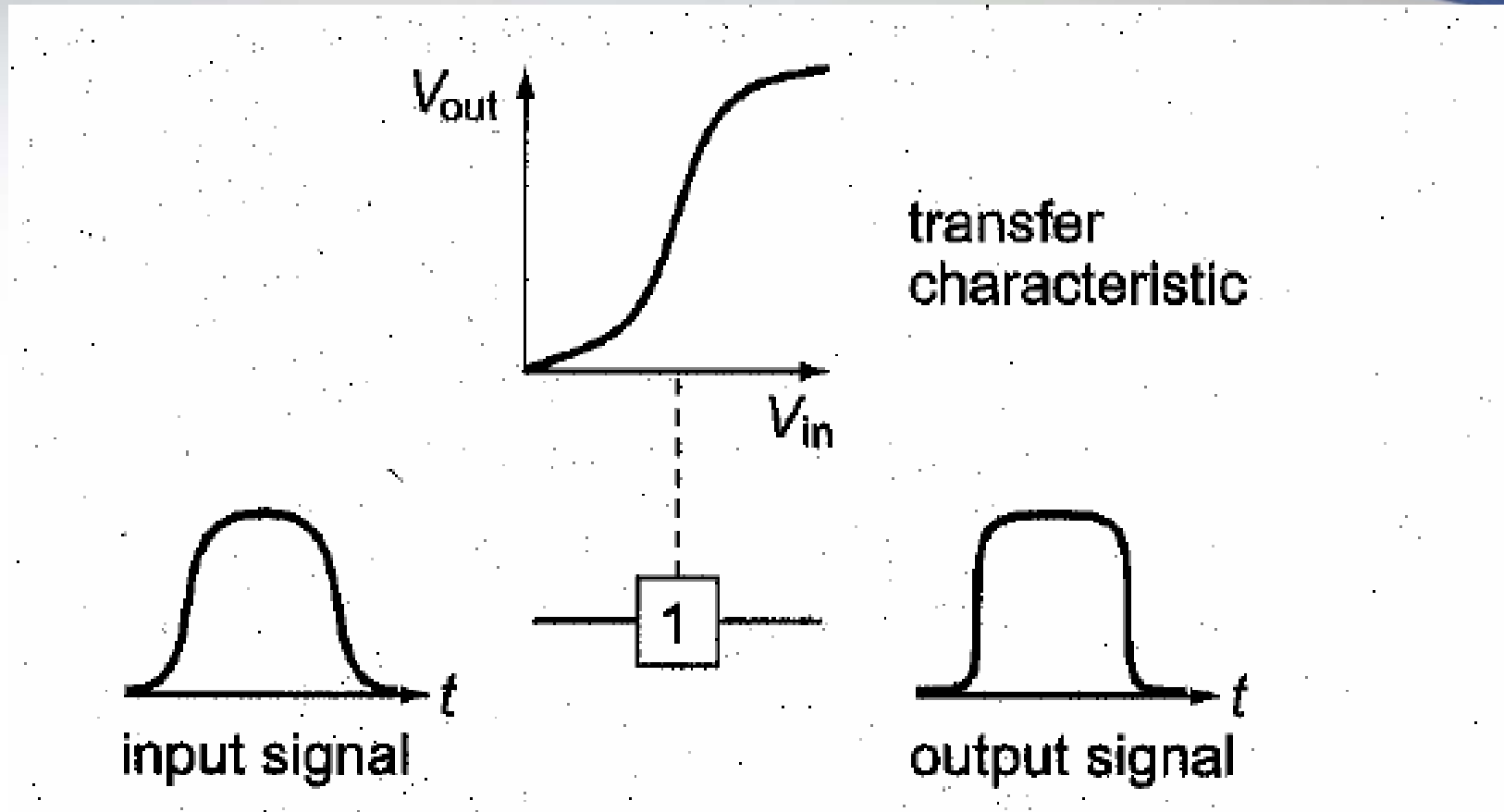
Requirements to Win

- Cost
- Low Power
- Performance
- Reliable

Non-Linearity (Signal)

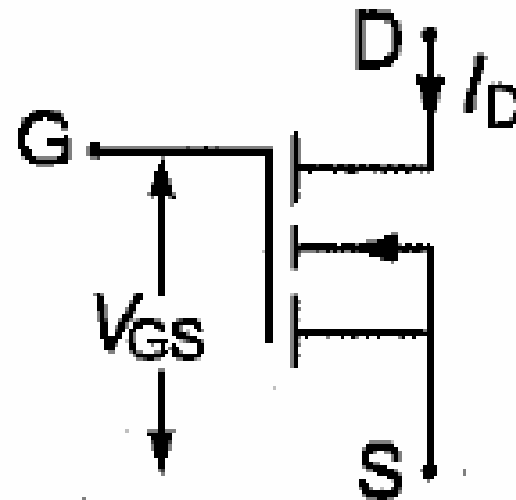
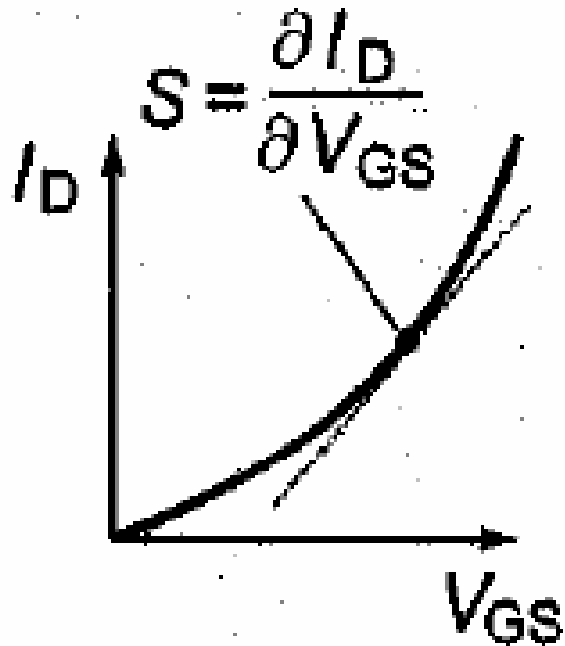


Non-Linearity (Signal)

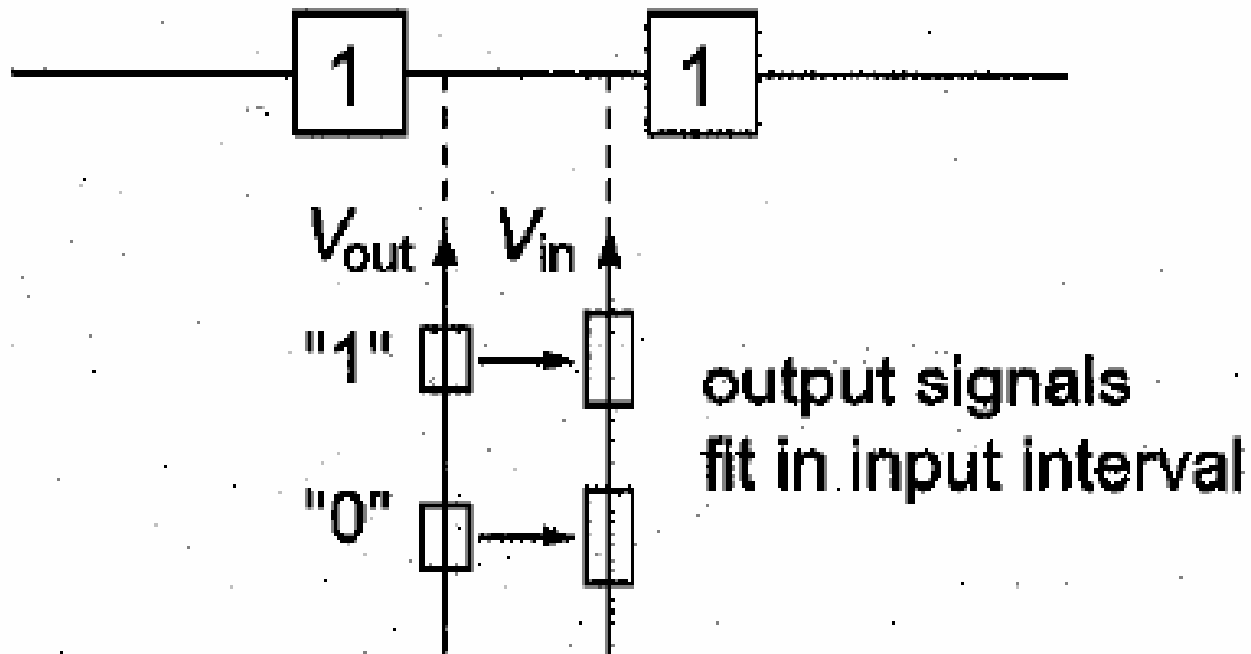


Power Amplification

MOSFET transfer characteristic

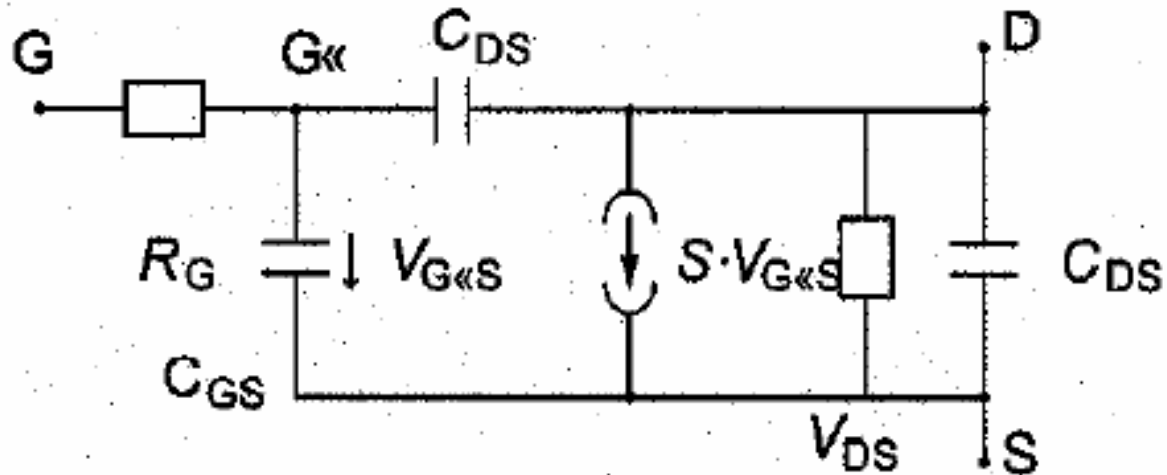


Concatenability



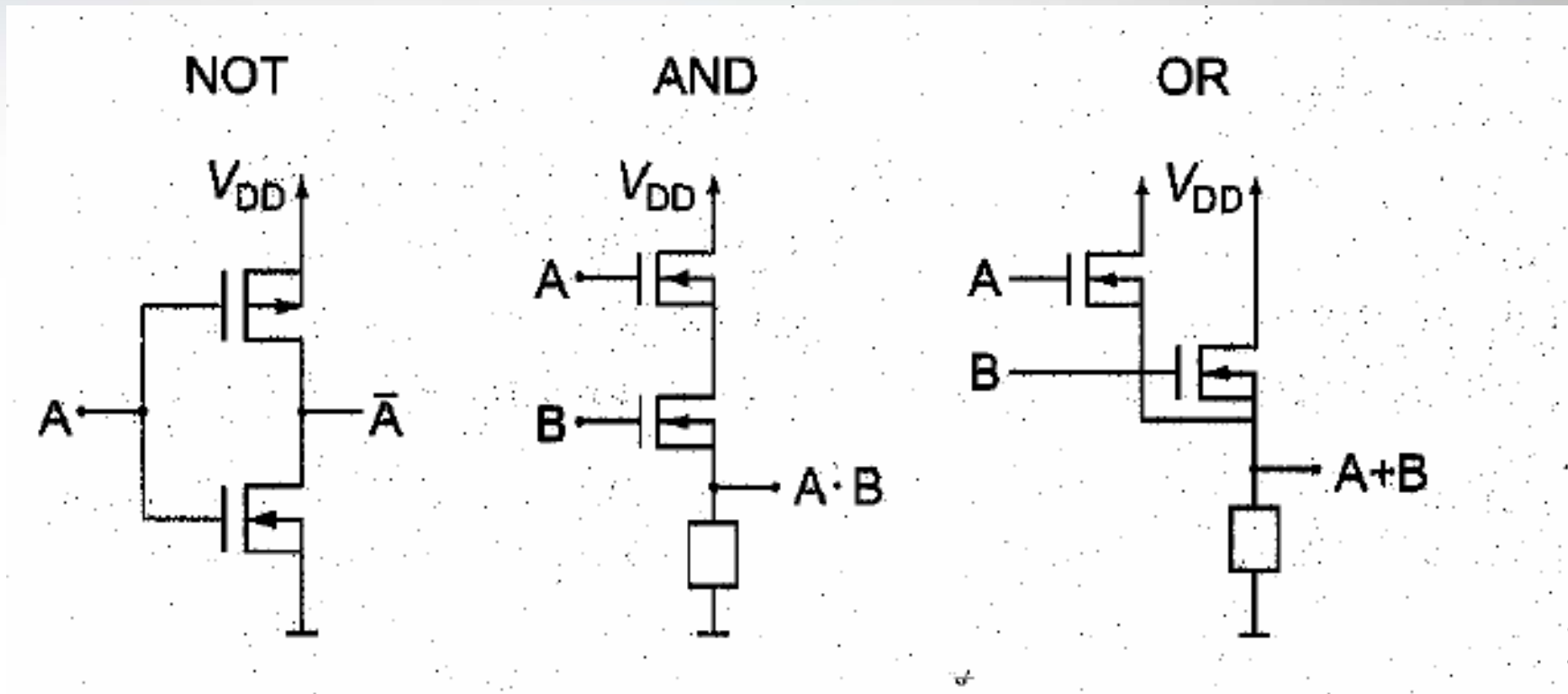
Feedback Prevention

Dynamic small-signal
MOSFET model



Feedback through C_{GS} & C_{DS} increases with $\omega \uparrow \Rightarrow S(\omega) \downarrow$

Basic Logic Functions



Summary

