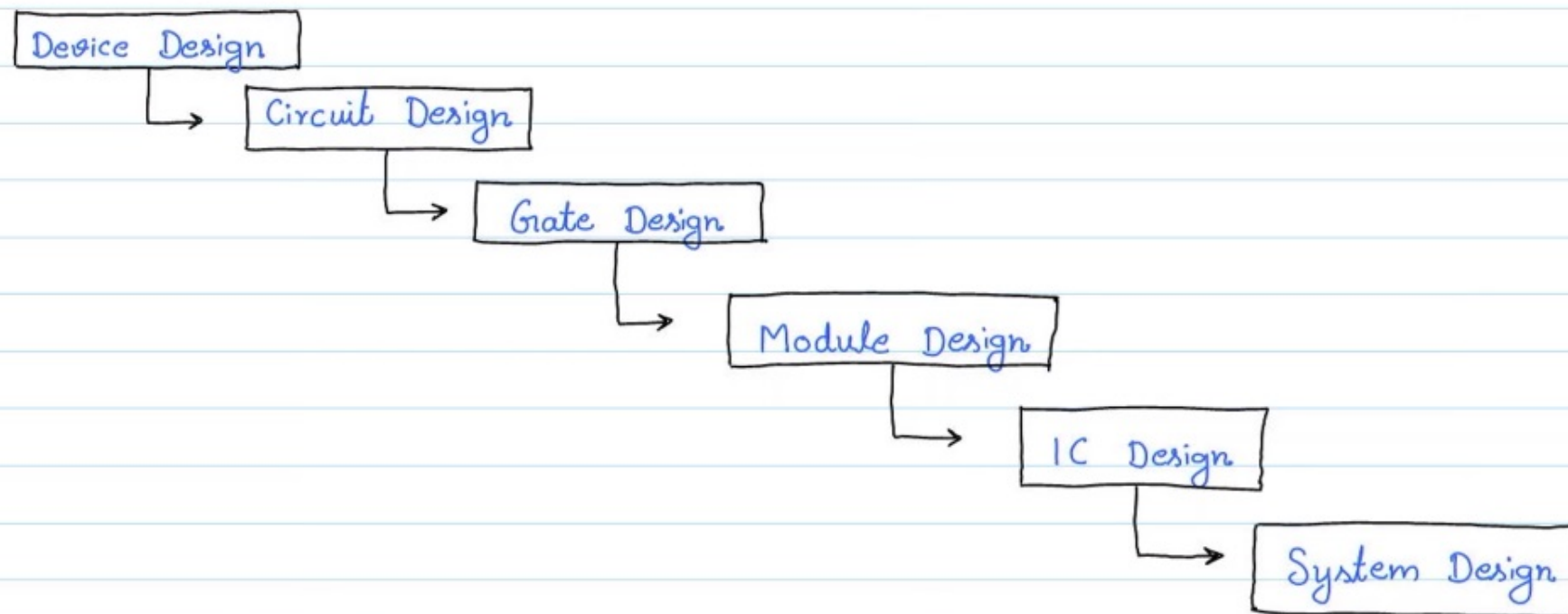
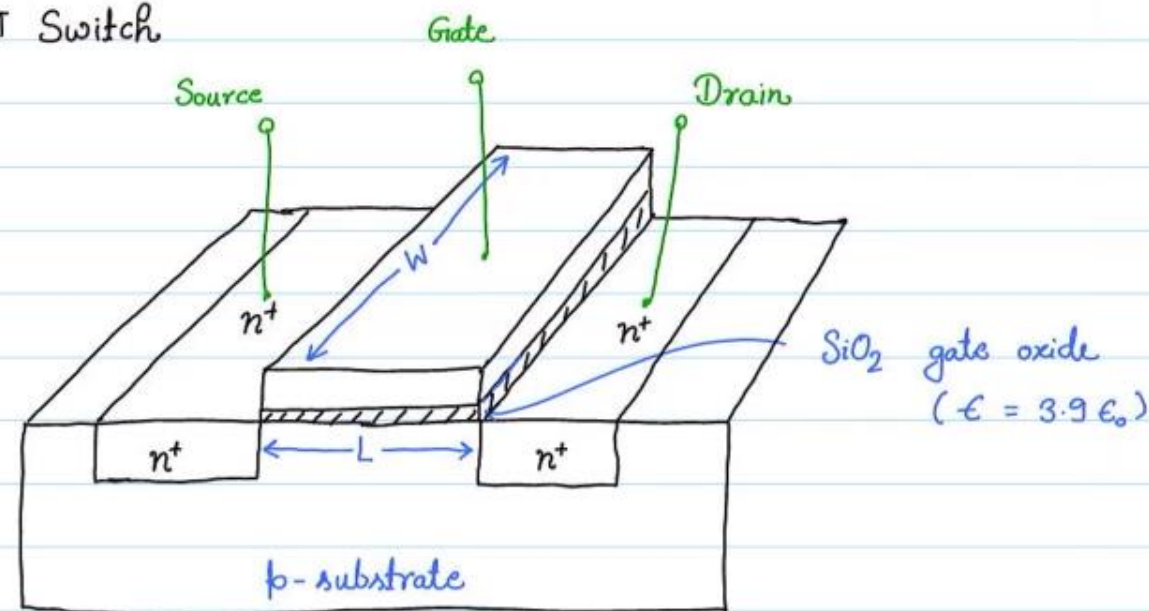


Electronic Design Stages :



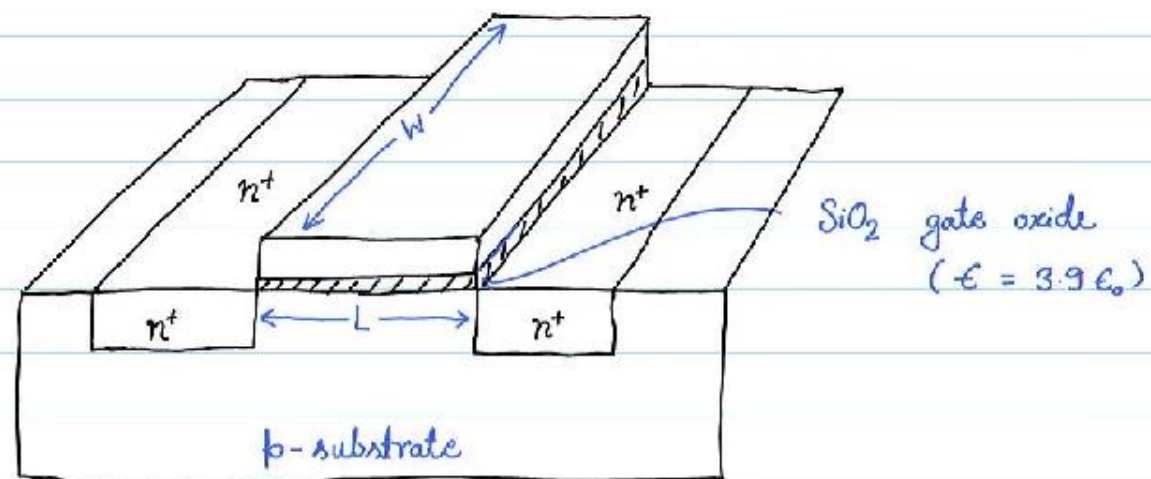
Device Design : MOSFET Switch



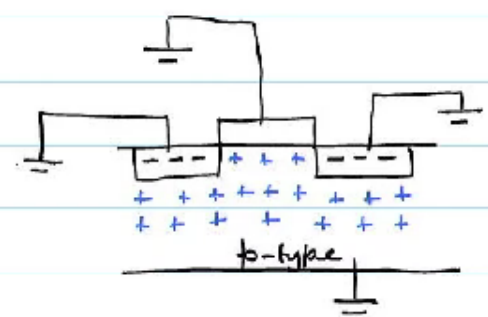
MOSFET is fabricated by various processing steps.

Multiple implant / lithography steps involved to fabricate the device.

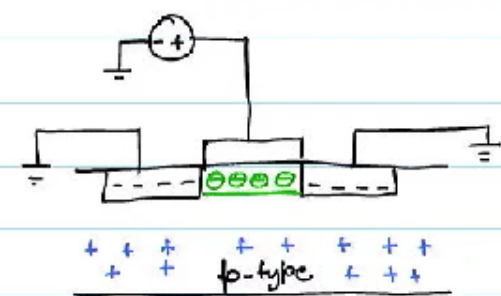
Device Design : MOSFET Switch



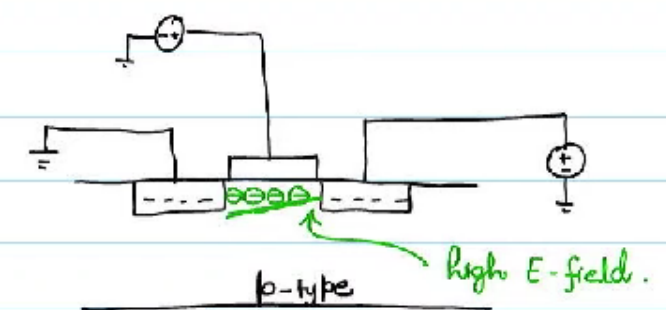
MOSFET Working : Enhancement mode.



(a)

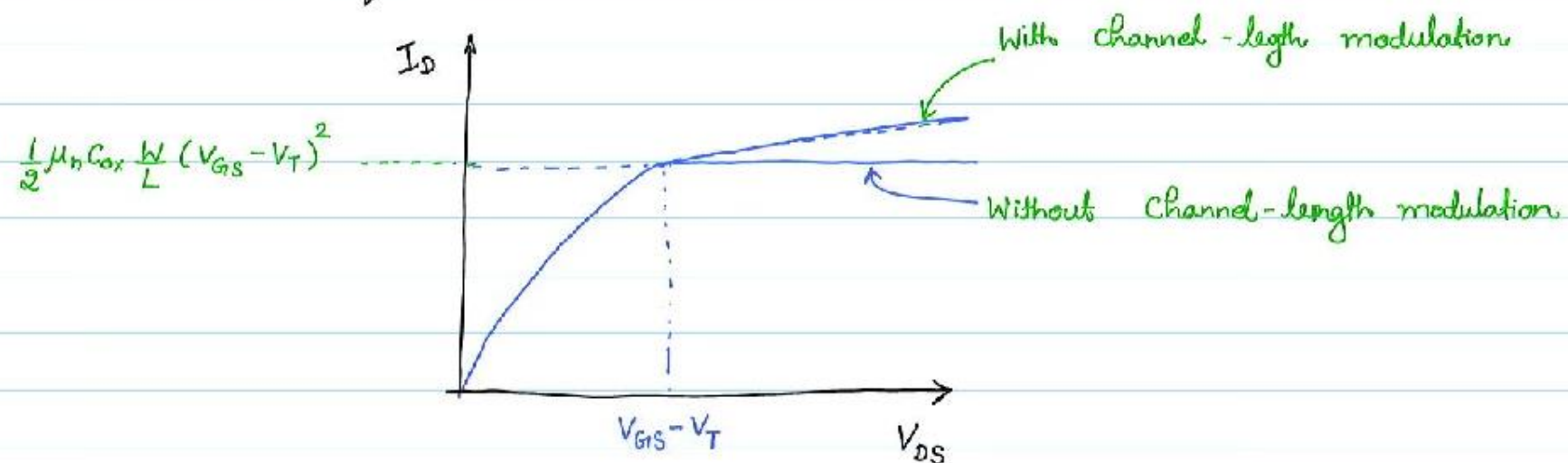


(b)



(c)

MOSFET Characteristics & Equation:



$$I_D = \frac{1}{2} \mu_n C_{ox} \frac{W}{L} (V_{GS} - V_T)^2 (1 + \lambda V_{DS})$$

Device Model :

→ BSIM : Berkeley Short - Channel IGFET Model

Transistor is modelled using multiple device parameters.

L : Channel Length

W : Channel Width

V_T : Threshold Voltage

λ : Channel - length modulation factor
:
:
:

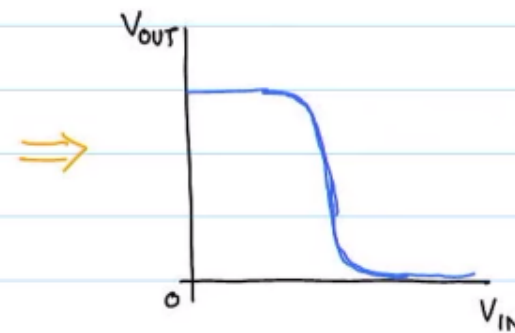
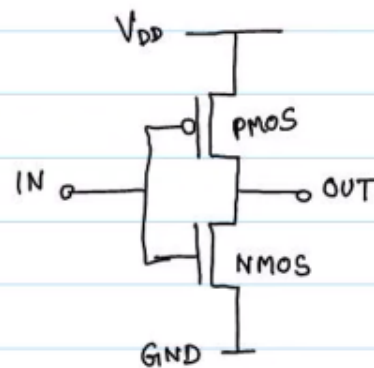
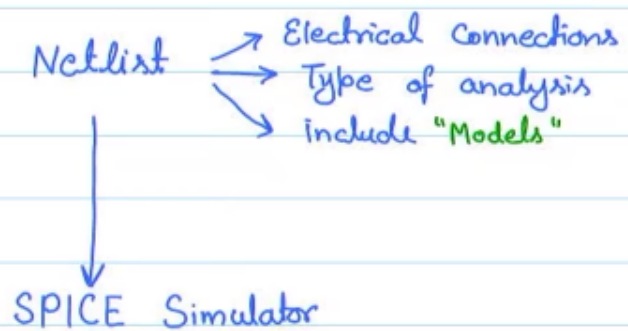
1 → Primarily developed for MOSFET

2 → Physics - based model , scalable

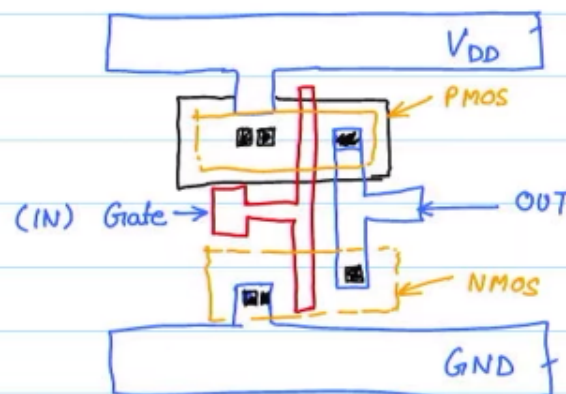
3 → more than 25 parameters , just to model V_T of MOSFET.

4 → Small - signal applications

② Circuit Design Stage :



Layout



③ Gate Level Design : Digital Design

→ Prepare digital model using Verilog / VHDL

Verilog code for a NAND Gate:

```
module logic_gate (c,a,b);  
    output c;  
    input a,b;  
    nand n1(c,a,b);  
endmodule
```

