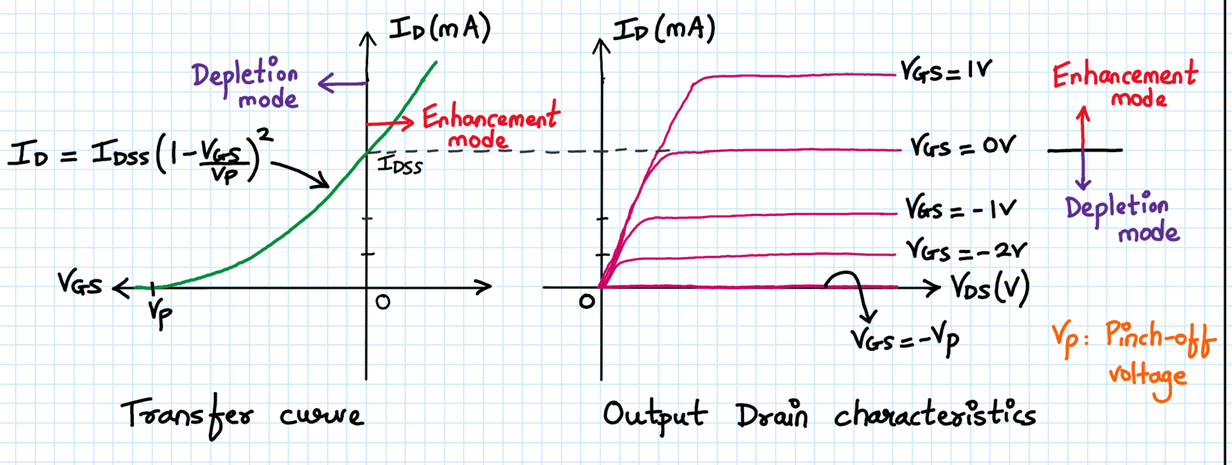
MOSFET device characteristics

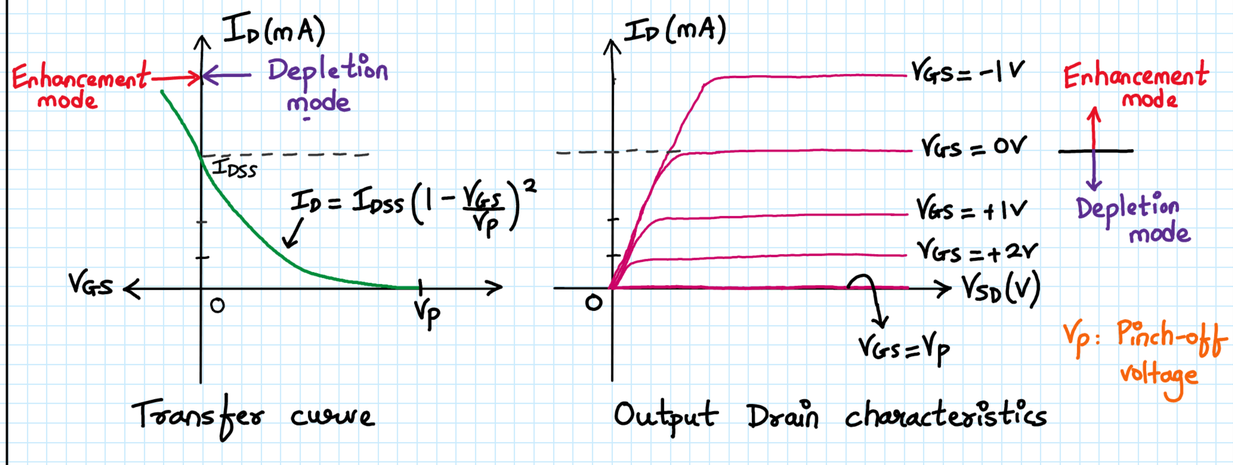
01 July 2021 23:52

Todays topic:
MOSFET device characteristics

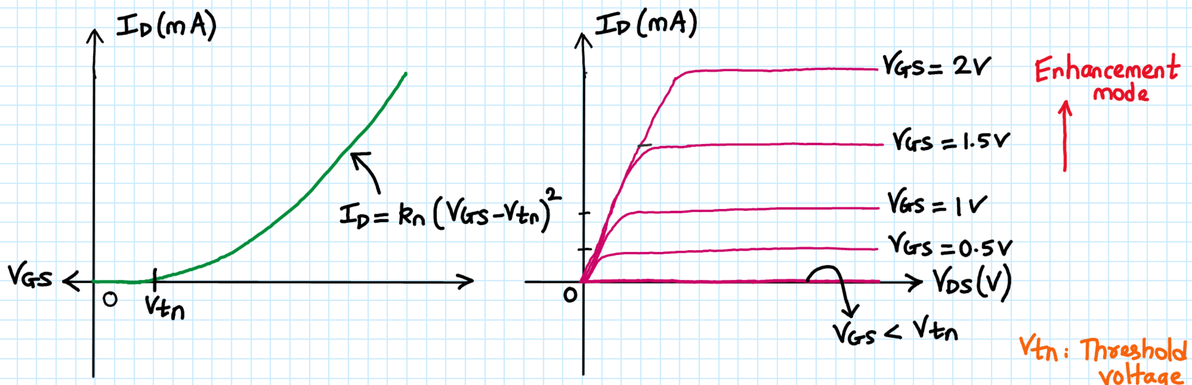
1) N channel depletion mode MOSFET:



2) P channel depletion mode MOSFET:



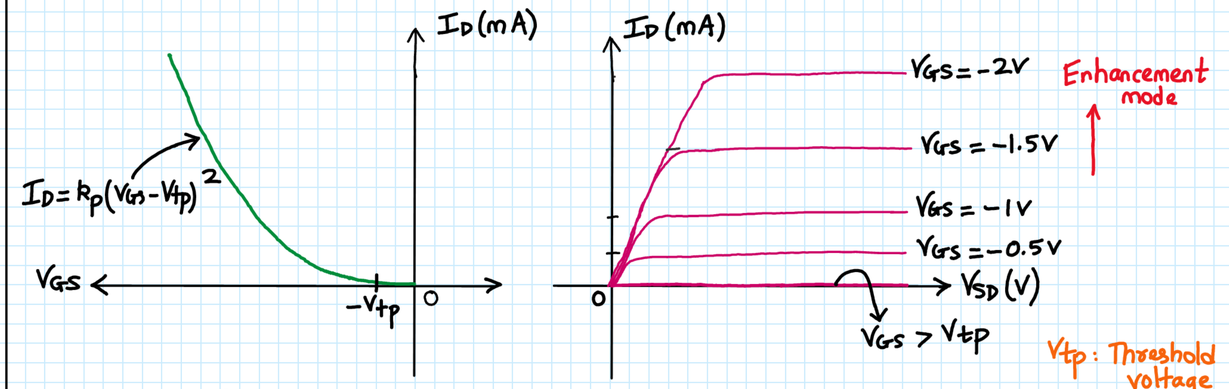
3) N channel enhancement mode MOSFET:



$V_{GS} > V_{TN}$
$V_{DS} < V_{GS} - V_{TN}$ — Linear

$V_{GS} = 2V$, $V_{DS} = 1V$, $V_{TN} = 0.5V$

4) P channel enhancement mode MOSFET:



Numerical 1: In an enhancement n channel MOSFET, V_{GS} is 2V, V_{DS} is 1V and the threshold voltage V_{tn} is 0.5V. What is the mode of operation of MOSFET

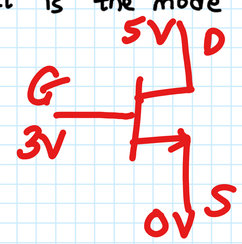
Solution: $V_{DS} = 1V$

$V_{GS} - V_{tn} = 2 - 0.5 = 1.5V$

i.e $V_{DS} < V_{GS} - V_{tn}$

Also, $V_{GS} > V_{tn}$ i.e $2V > 0.5V$

∴ The given MOSFET is working in Linear mode of operation



$V_{TN} = 1V$

$I_D = k_n(V_{GS} - V_T)^2$ → sat^n region