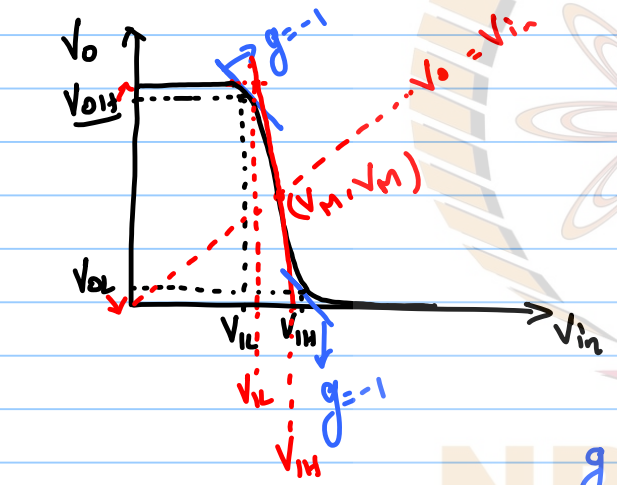
30/08/2019

EE5311

MODULE-3

NOISE MARGIN



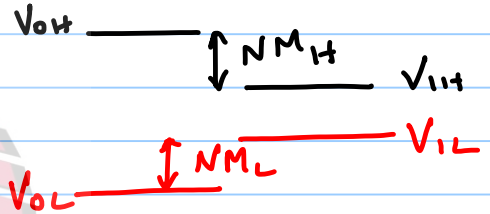
g @ $V_{in} = V_o = V_M = \left.\frac{dV_o}{dV_{in}}\right|_{V_{in}=V_o=V_M}$

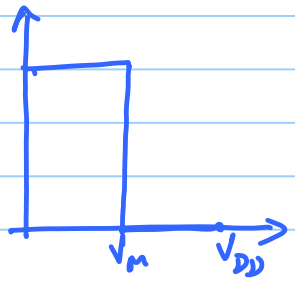
$g = \frac{dV_o}{dV_{in}}$

$$V_{IL} = V_M + \left(\frac{V_{DD}-V_M}{g}\right)$$

$$V_{IH} = V_M - \frac{V_M}{g}$$

WORKS ONLY WHEN CCM IS > 0





$V_{OH} > V_{IH}$

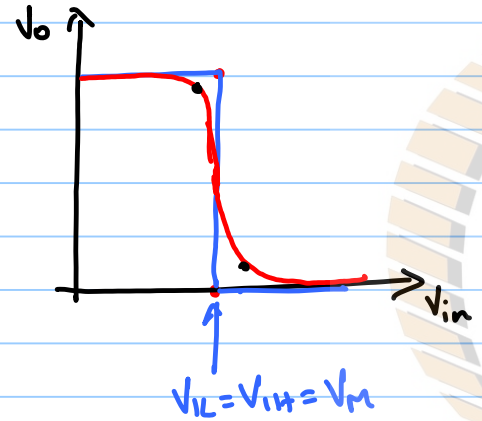
NOISE MARGIN HIGH = $NM_H = V_{OH} - V_{IH}$

$= V_{DD} - \left(V_M - \frac{V_M}{g}\right)$

$V_{OL} < V_{IL}$

$NM_L = V_{IL} - V_{OL}$

$= V_{IL} = V_M + \left(\frac{V_{DD} - V_M}{g}\right)$



@ $V_{in} = V_M = V_o$

$$I_{DSn} = \frac{1}{2} K_n' \frac{W_n}{L} (V_{in} - V_{Tn})^2$$

$$I_{DSp} = \frac{1}{2} K_p' \frac{W_p}{L} (V_M - V_{DD} - V_{Tp})^2$$

$$g \propto \frac{1}{2\lambda_n} \qquad (\text{if } \lambda_n = -\lambda_p)$$