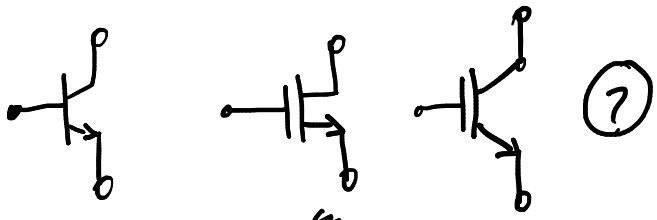

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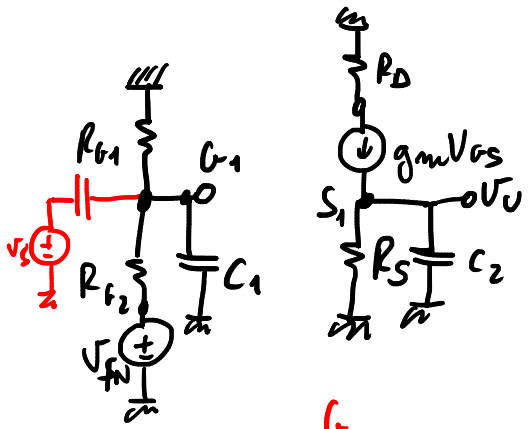
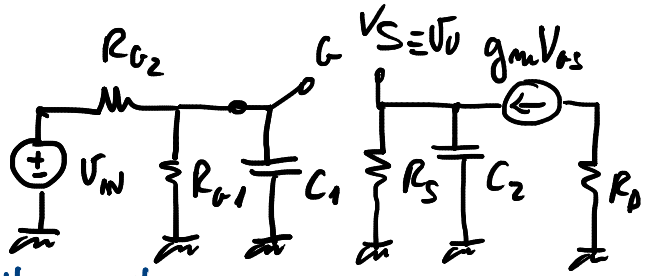
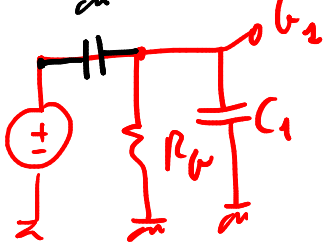
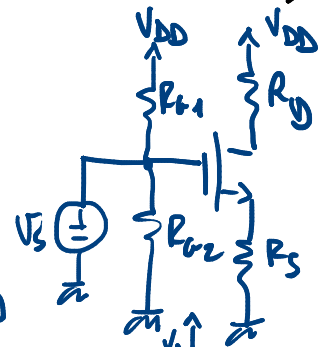
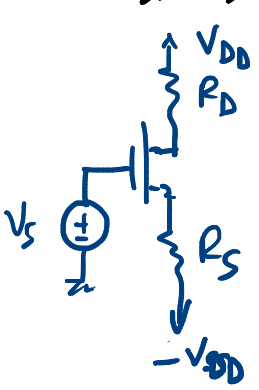
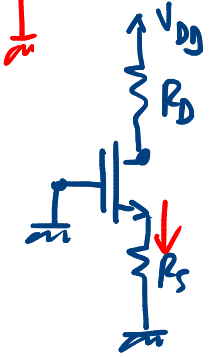


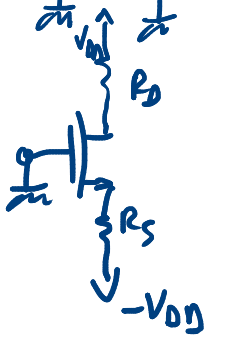












$V_G = 0$

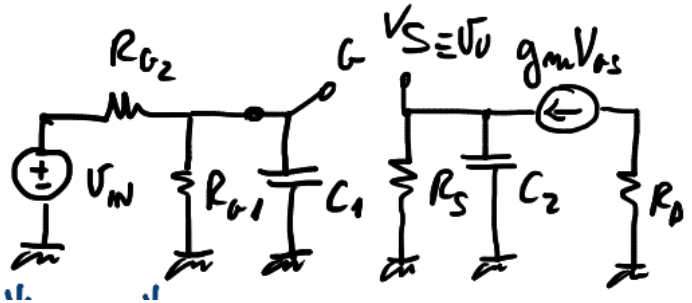
$V_S = R_S I_{DS}$

$V_{GS} = -V_S = -R_S I_{DS} \geq V_T$

$V_{GS} = V_{DD} - R_S I_{DS}$

$V_S = R_S I_{DS} - V_{DD}$

$V_{GS} = 0$



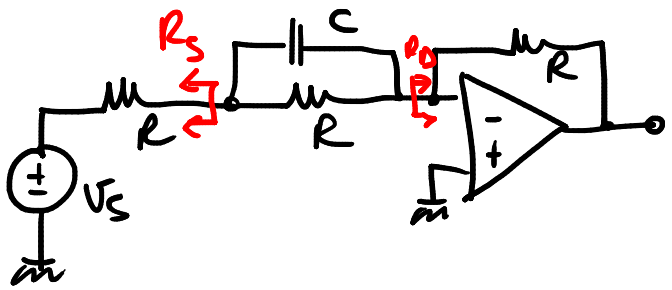
$$A_V(s) = \frac{V_U}{V_{IN}} = \frac{A_{V0}}{\left(\frac{s}{\omega_{p1}} + 1\right)\left(\frac{s}{\omega_{p2}} + 1\right)}$$

$$\omega_{p1} = \frac{1}{C_1 R_{VC1}} \qquad R_{VC1} = R_{G1} \| R_{G2} = 5\,k\Omega$$

$$\omega_{p1} = 200\,rad/sec \qquad \omega_{p2} = \frac{1}{C_2 R_{VC2}} \qquad R_{VC2} = R_S \| \frac{1}{g_m} = ?$$

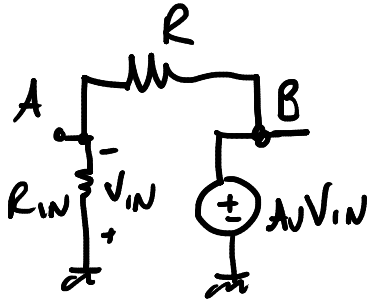
$$\omega_{p2} = 2\,krad/sec$$

$$A_{V0} = \frac{R_S g_m}{R_S g_m + 1} \frac{R_{G1}}{R_{VC1} + R_{G2}} = 0{,}25$$

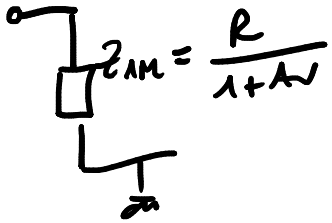


$$R_{VC} = R \,//\, [R_S + R_D]$$

$R_S = R$
$R_D \Rightarrow$

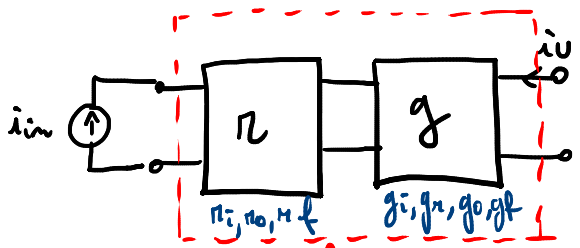


C



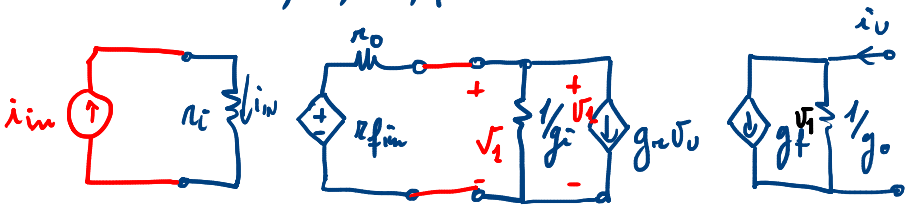
$$R_D = \frac{R}{1+A_V}$$

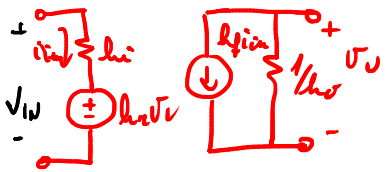
$$R_{VC} = R \,//\, \left[R + \frac{R}{1+A_V}\right]$$



h

h_i, h_0, h_r, h_f





$$h_i = \left.\frac{V_{in}}{i_{in}}\right|_{V_U=0}$$

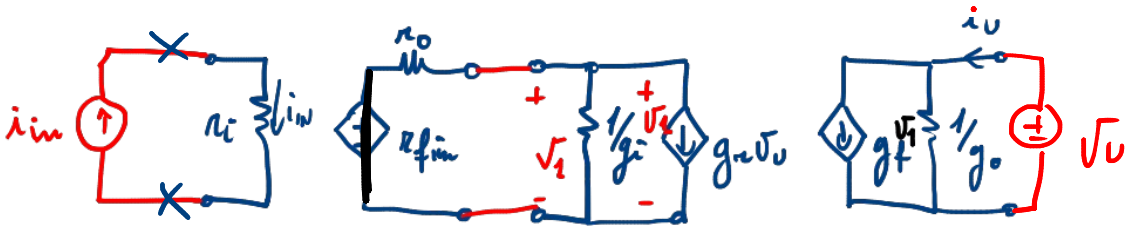
$h_i = r_i$ $\quad V_{in} = r_i \cdot i_{in} \Rightarrow$ $\quad h_i = \dfrac{V_{in}}{i_{in}} = r_i$

$$h_r = \left.\frac{V_{in}}{V_U}\right|_{i_{in}=0} = 0$$

$$h_f = \left.\frac{i_U}{i_{in}}\right|_{V_U=0} \Rightarrow i_U = g_f V_1 \qquad V_1 = r_f i_{in} \cdot \frac{1/g_i}{1/g_i + r_0}$$

$$i_U = \frac{g_f r_f}{1 + g_i r_0} i_{in} \Rightarrow h_f = \frac{g_f r_f}{1 + g_i r_0}$$

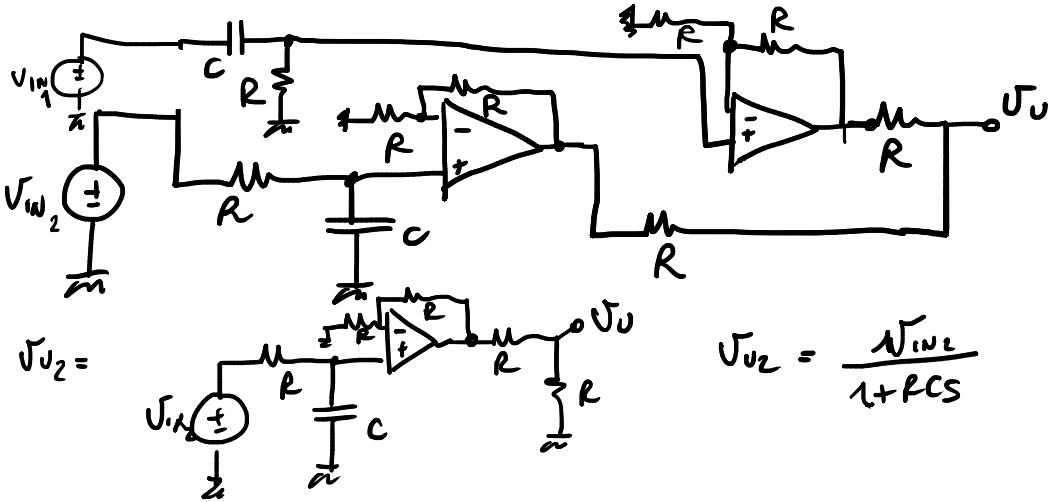
$$h_0 = \left.\frac{i_U}{V_U}\right|_{i_{in}=0}$$



$$i_v = g_o v_v + g_f v_1$$

$$v_1 = -g_m v_v \; 1/g_i \| r_o = -g_m v_v \frac{r_o}{1+g_i r_o}$$

$$i_v = \left[g_o - \frac{g_f g_m r_o}{1+g_i r_o} \right] v_v \rightarrow h_o = g_o - \frac{g_f g_m r_o}{1+g_i r_o}$$



$$v_{v_2} = \frac{v_{in_2}}{1+RCs}$$

$$v_{v_2} = \frac{RCs}{1+RCs} v_{in_2} \qquad v_v = v_{v_2} + v_{v_1} = \frac{RCs+1}{1+RCs} v_{in_2}$$