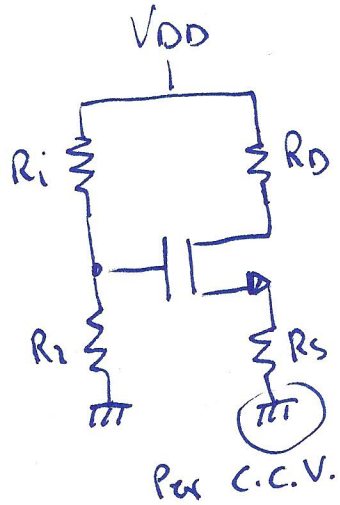
CONTINUA



$$V_G = \frac{V_{DD} R_2}{R_1 + R_2} = \frac{10 \cdot 4}{10} \quad 4V$$

$$V_D = V_{DD} - R_D I_D$$

$$V_S = R_S I_D$$

$$I_D = K(V_G - V_S - V_T)^2$$

$$2I_D = (4 - R_S I_D \cdot 1)^2 \qquad 2I_D = \left(3 - \tfrac{1}{2} I_D\right)^2$$

$$\tfrac{1}{4} I_D^2 - 3I_D - 2I_D + 9$$

$$I_{D_{1/2}} \quad \frac{5 \pm \sqrt{25 - 9}}{0{,}5} \quad \frac{5 \pm 4}{2} \begin{cases} 2 \\ 18 \end{cases}$$

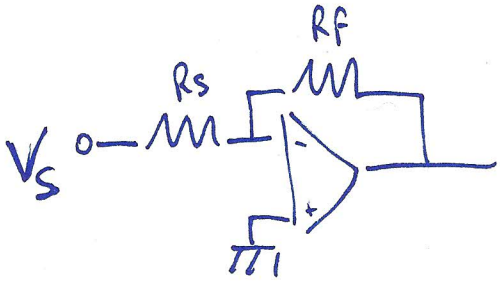
SE I_D 2 $V_S = 1$ 1° Hp di SATURAZIONE $V_{GS} > V_T$ $4 - 1 > 1$ OK

18 $V_S = 9$ 1° Hp di SATURAZIONE $V_{GS} > V_T$ $4 - 9 > 1$ NO

$I_D = 2mA$ $V_S = 1V$ $V_G = 4V$ $V_D = 10 - 2 = 8V$

2° Hp di SATURAZIONE $V_D > V_G - V_T$ $8 > 4 - 1$ OK

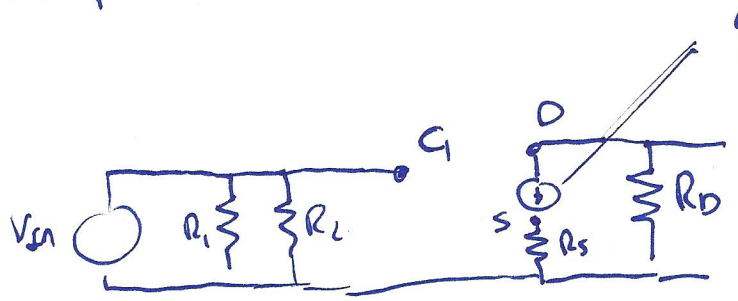
Polarizzazione Q_1 $\begin{cases} V_{GS} = 4 - 1 = 3V \\ I_D = 2 \\ V_{DS} = 8 - 1 = 7V \end{cases}$



$$V_{OUT} = -\frac{R_F}{R_S} V_S = -\frac{2}{0{,}5} 1 = -4V$$

Per piccoli segnali

$R_1 \| R_2 = \frac{6 \cdot 4}{10} = 2,4$



$g_m = 2K(V_{GS} - V_T) = 3 - 1 = 2$ mA/V

$V_{gs} = V_g - V_s$

$V_{in} R_1 \| R_2$

$2,4 V_{in}$

R_S (I)

mA $I = g_m V_{gs}$

$I = g_m (V_g - V_s)$

$I = 2 (2,4 V_{in} - V_s$

$V_s = \frac{1}{2} R (2,4 V_{in} - V_s)$

$V_s = 2,4 V_{in} - V_s \qquad 2V_s = 2,4 V_{in}$

$V_s = 1,2 V_{in}$

$V_{gs} = (2,4 V_{in} - 1,2 V_{in}) = 1,2 V_{in}$

$A_i = V_{out(trans.)} = -g_m V_{gs} R_D = -2 \cdot 1,2 V_{in} \cdot 1 = -2,4 V_{in}$

$A_{V(transistor)} = \frac{-2,4 V_{in}}{V_{in}} = -2,4$

$A_{V_{ampl.}} = -\frac{R_F}{R_S} = \frac{2}{0,5} = -4$

$A_{V_{TOT}} = -2,4 \cdot -4 = -9,6$