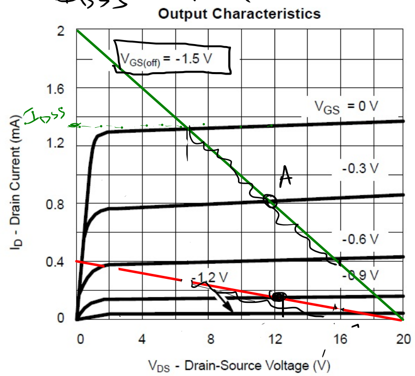
$1k \| 100k \simeq 1k\Omega \quad \frac{1 \cdot 100k}{100+1} = \frac{100k}{101k} \quad \frac{9}{0.3} = 30$

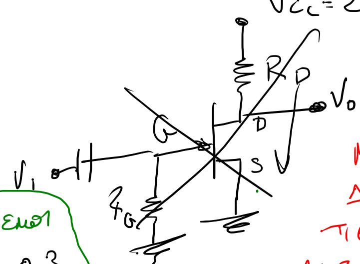
$I_{DSS} \approx 1.4mA$



$$I_D = I_{DSS}\left(1 - \frac{V_{GS}}{V_{GS,off}}\right)^2$$

ΘΕΛΩ ΝΑ ΛΕΙΤΟΥΡΓΗΣΕΙ ΤΟ JFET ΣΤΗΝ ΘΕΣΗ Α.

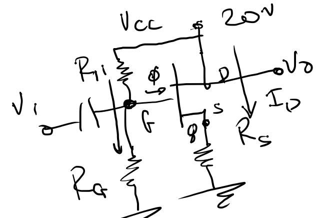
$V_{CC} = 20V$



$V_{CC} = R_D \cdot I_D + V_{DS}$

ΜΕ ΑΥΤΟ ΤΟ ΚΥΚΛΩΜΑ ΔΕΝ ΜΠΟΡΩ ΝΑ ΠΕΤΥΧΩ ΤΟ ΣΗΜΕΙΟ ΛΕΙΤΟΥΡΓΙΑΣ Α:

ΘΕΛΩ ΠΕΡΙΣΣΟΤΕΡΕΣ ΑΝΤΙΣΤΑΣΕΙΣ :)



ΠΕΡΙΟΡΙΣΜΟΙ

$V_{GS} = -0.3$

$I_D = 0.8mA$

$V_{DS} = 12V$ $\Rightarrow V_S = 8V$

$V_G = 7.7V$ ← ΑΔΥΝΑΤΟΝ ΔΙΟΤΙ $V_G = 0V$

$$\frac{V_G}{V_{CC}} = \frac{R_G}{R_1 + R_G} \Rightarrow \frac{7.7}{20} = \frac{R_G}{R_1 + R_G} \Rightarrow \frac{7.7}{20} = \frac{1k}{R_1 + 1k} \Rightarrow$$

ΑΥΘΑΙΡΕΤΑ ΘΕΤΩ $R_G = 1k\Omega$

$$R_1 + 1 = \frac{20}{7.7} \Rightarrow R_1 = \frac{20}{7.7} - 1 \Rightarrow R_1 = 2.6 - 1 = 1.6k\Omega \Rightarrow$$

$R_1 = 1.6k\Omega$ $\quad R_S = \frac{V_S}{I_D} = \frac{8V}{0.8mA} = 10k\Omega \Rightarrow R_S = 10k\Omega$

ΠΕΡΙΟΡΙΣΜΟΙ

$I_{DSS} = 1.4mA$

$V_{GS,off} = -1.5V$

(A) → $V_{GS} = -0.3$

$V_{CC} = 20V$

$V_{DS} = 12V$

ΑΡΙΘΜΗΤΙΚΗ ΕΠΙΛΥΣΗ

$$I_D = I_{DSS}\left(1 - \frac{V_{GS}}{V_{GS,off}}\right)^2 = 1.4\left(1 - \frac{-0.3}{-1.5}\right)^2 \Rightarrow$$

$$\Rightarrow I_D = 1.4mA(1 - 0.2)^2 = 1.4mA(0.8)^2 \Rightarrow$$

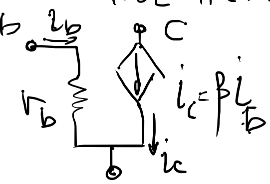
$$I_D = 1.4mA \times 0.64 \cong 0.9mA \Rightarrow I_D = 0.9mA$$

$$20V = R_S \cdot I_D + V_{DS} \Rightarrow 20V = R_S \times 0.9mA + V_{DS} \Rightarrow R_S = \ldots$$

$V_{DS} = 12V$

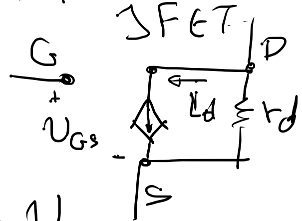
BJT AC ΑΝΑΛΥΣΗ

ΕΝΕΡΓΟΣ ΠΕΡΙΟΧΗ



$i_c = \beta i_b$

JFET



$i_D = g_m V_{GS}$

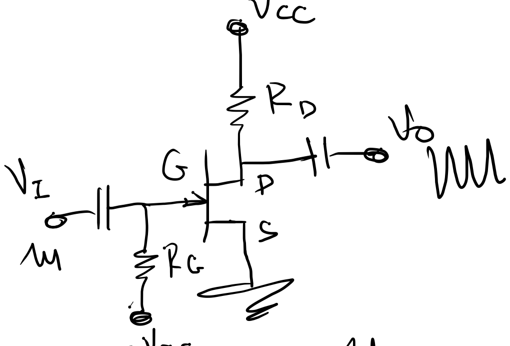
$$I_D = g_m V_{GS}$$

$$I_D = I_{DSS}\left(1-\frac{V_{GS}}{V_{GS,off}}\right)^2 \Rightarrow$$

$$\frac{\partial I_D}{\partial V_{GS}} = \frac{2I_{DSS}}{V_{GS,off}}\left(1-\frac{V_{GS}}{V_{GS,off}}\right) = g_m = g_{m0}\left(1-\frac{V_{GS}}{V_{GS,off}}\right)$$

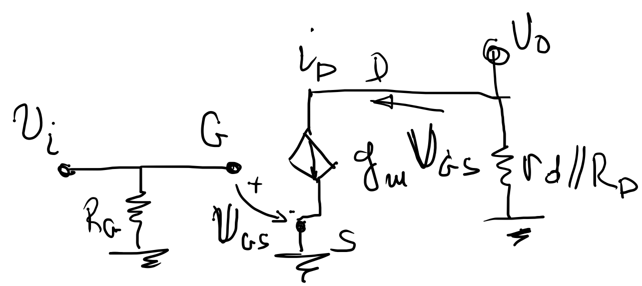
$$g_{m,min} \triangleq \left.\frac{\partial I_D}{\partial V_{GS}}\right|_{V_{GS}=V_{GS,off}} = 0$$

$$g_{m0} \triangleq \left.\frac{\partial I_D}{\partial V_{GS}}\right|_{V_{GS}=0} = \frac{2I_{DSS}}{|V_{GS,off}|}$$



$$\frac{V_o}{V_I}$$

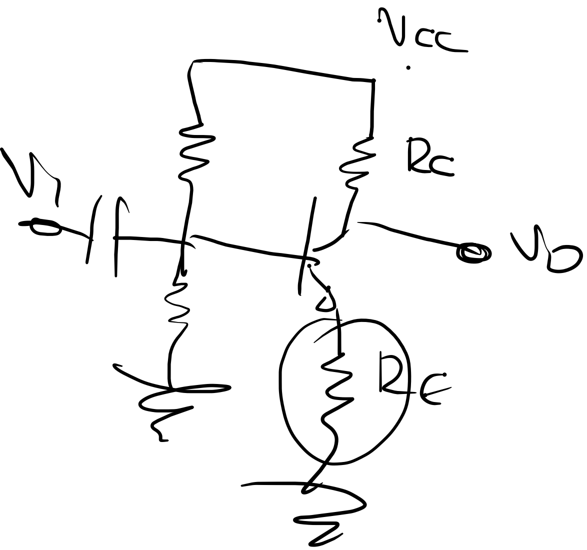
ΙΣΟΔΥΝΑΜΟ AC



$$\frac{V_o}{V_i} = \frac{-(r_d\|R_D)\, i_D}{V_{GS}} = \frac{-(r_d\|R_D)\cdot g_m V_{GS}}{V_{GS}} \Rightarrow$$

$$\frac{V_o}{V_i} = -(r_d\|R_D)\cdot g_m = -(r_d\|R_D)\cdot g_{m0}\left(1-\frac{V_{GS}}{V_{GS,off}}\right)$$

$R_D \ll r_d$



$$\frac{\Delta V_o}{\Delta V_i} \cong \frac{R_C}{R_E}$$

$\beta \gg 1$

$$g_m = \frac{\partial I_D}{\partial V_{GS}} = \frac{2 I_{DSS}}{V_{GS,off}}\left(1 - \frac{V_{GS}}{V_{GS,off}}\right)$$

$\rightarrow$ AC