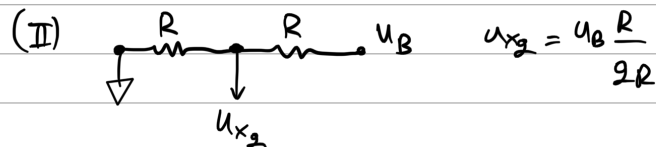
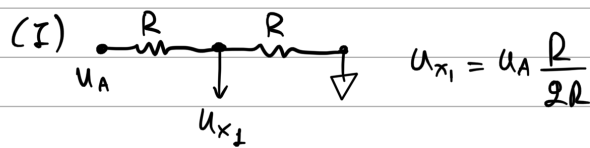
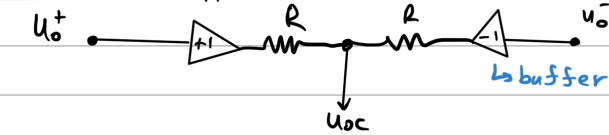
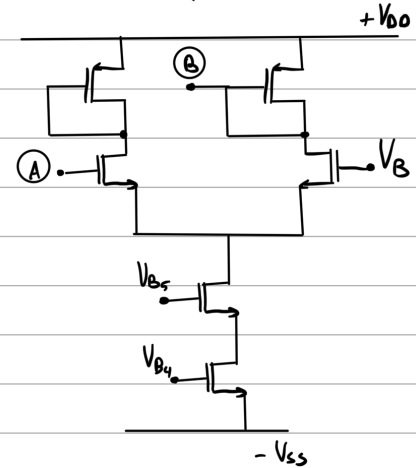


Δίκτυο Ανίχνευσης CM

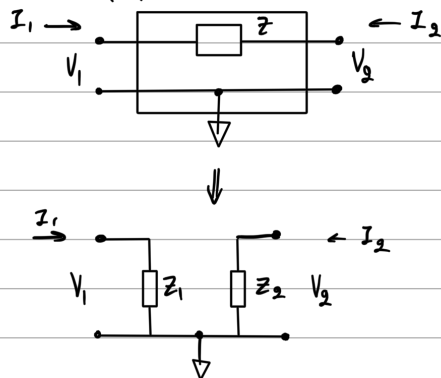


(I) + (II) $\rightarrow u_x = \frac{u_A + u_B}{2} = u_{oc}$

Δίκτυο Αναδράσης



Θεώρημα Miller

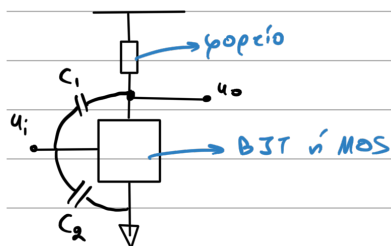


$$A_{V_0} = \frac{V_2}{V_1}$$

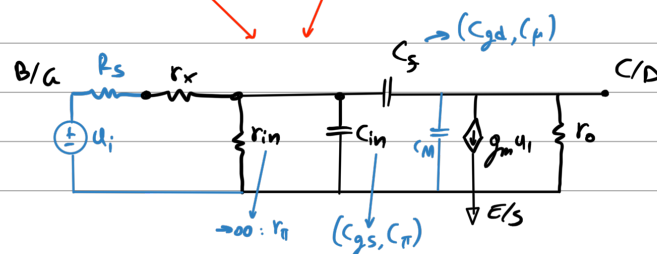
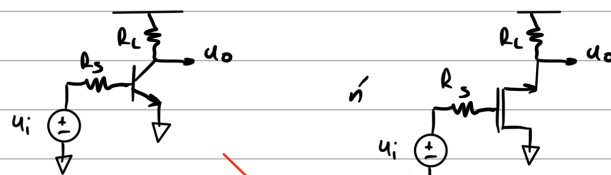
$$Z_1 = \frac{Z}{1 - A_{V_0}}$$

$$Z_2 = \frac{Z \cdot A_{V_0}}{A_{V_0} - 1}$$

Ενδοχυσμός C_s^E



$C_i = C_2 + C_{Miller} \rightarrow \text{αυξοοιχείται σm } C_1$



$$C_M = (1 - A_{V_0}) C_s = (1 + g_m r_o) C_s$$

$$u_i = \frac{r_{in}}{1 + sC_t r_{in}} u_i$$

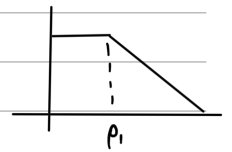
$$\frac{r_{in}}{1 + sC_t r_{in}} + R_s + r_x$$

$$u_o = -g_m R_L u_i$$

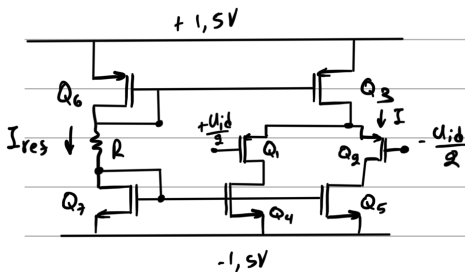
$$A(s) \equiv \frac{u_o}{u_i} = -g_m \cdot R_L \cdot u_i = K \cdot \frac{1}{1 - \frac{s}{p_1}} \rightarrow$$

$$\rightarrow K = -g_m R_L \frac{r_{in}}{r_{in} + r_e + R_s} \rightarrow A_o \approx g_m R_L$$

$$\rightarrow p_1 = \frac{1}{[(R_s + r_x) \parallel r_{in}] \cdot [C_{in} + C_f (1 + g_m R_L)]}$$



Άσκηση 9.23



$$\theta \acute{\epsilon} \lambda \omega \quad A_d = 50 \text{ V/V}, \quad I_{res} = I = 200 \mu\text{A}$$

$$Q_6^G = Q_3^G = 0,8 \text{ V}$$

$$Q_7^G = Q_4^G = Q_5^G = -0,8 \text{ V}$$

$$\mu_n C_{ox} = 2,5 \mu\text{A/V}^2, \quad \mu_p C_{ox} = 250 \mu\text{A/V}^2$$

$$V_{TN} = |V_{TP}| = 0,5 \text{ V}$$

$$V_{AN} = |V_{AP}| = 10 \text{ V}$$

αγνώρι φ. Early στους DC υπολογισμούς

$\left(\frac{W}{L}\right) ?$

$$R = \frac{V_{G6} - V_{A7}}{I_{res}} = 8 \text{ k}\Omega$$

$$\text{Απώ } I_{res} = I \rightarrow Q_6, Q_3 \text{ ταιριασμένα} \rightarrow |V_{ov}|_{3,6} = \underbrace{(1,5 - 0,8)}_{V_{GS}} - 0,5 = 0,2 \text{ V}$$

$$0,2 = \frac{1}{2} \cdot 0,1 \left(\frac{W}{L}\right)_{3,6} \cdot 0,2^2 \rightarrow \left(\frac{W}{L}\right)_{3,6} = 100$$

tail current $\mu_p C_{ox}$

$$Q_4, Q_5 \rightarrow \frac{I}{2}, \quad Q_7 \rightarrow I$$

$$\frac{I}{2} = \frac{1}{2} \mu_n C_{ox} \left(\frac{W}{L}\right)_{4,5} \cdot V_{ov,4,5}^2 \rightarrow V_{ov,4,5} = -0,8 - (-1,5) - 0,5 = 0,2 \text{ V} \quad \acute{\alpha}\rho\alpha \left(\frac{W}{L}\right)_{4,5} = 20$$

$$\text{και } \left(\frac{W}{L}\right)_7 = 40$$

$$r_{o4} = r_{o5} = \frac{V_{AN}}{I/2} = 100 \text{ k}\Omega$$

$$r_{o1} = r_{o2} = \frac{|V_{AT}|}{I/2} = 100 \text{ k}\Omega$$

$$\rightarrow A_d = g_{m1,2} (r_{o1,2} \parallel r_{o4,5}) \rightarrow g_{m1,2} = 1 \text{ mA/V}$$

$$g_{m1,2} = \frac{2 \cdot (I/2)}{|V_{ov,1,2}|} \rightarrow V_{ov,1,2} = 0,2 \text{ V}$$

$$0,1 = \frac{1}{2} \cdot 0,1 \left(\frac{W}{L}\right)_{1,2} \cdot 0,2^2 \rightarrow \left(\frac{W}{L}\right)_{1,2} = 50$$