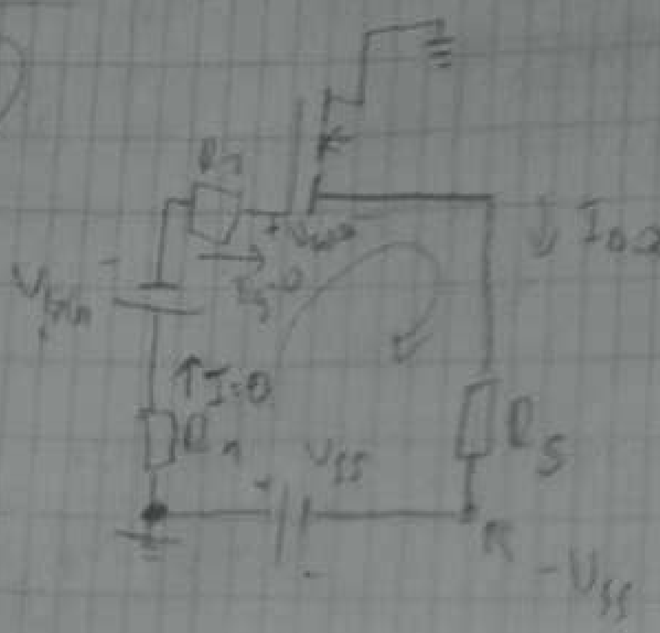
ZADACI

1.

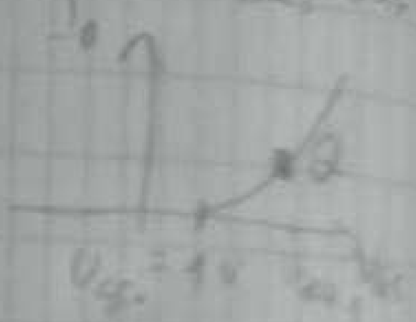



$V_{GG} + 0(R_1+R_2) + U_{GSQ} + \dots - V_{SS} = 0$ (1)

$I_{DQ} = \frac{K}{2}(U_{GSQ} - U_{GS0})^2$ (2)

(2) → (1) ⇒ $U_{GSQ_1} = 2V$

$U_{GSQ_2} = \dots$



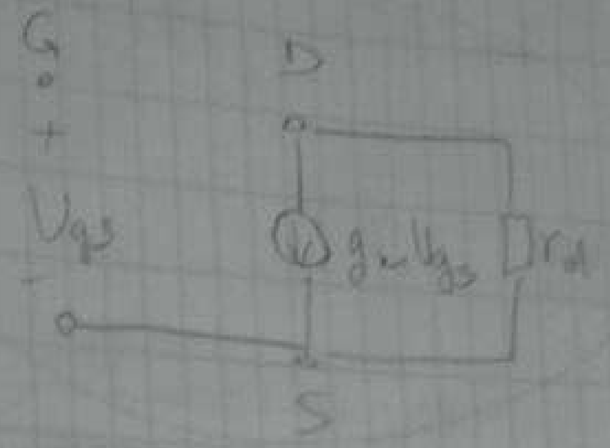

$I_{DQ} = \frac{K}{2}(U_{GSQ} - U_{GS0})^2 = 1mA$

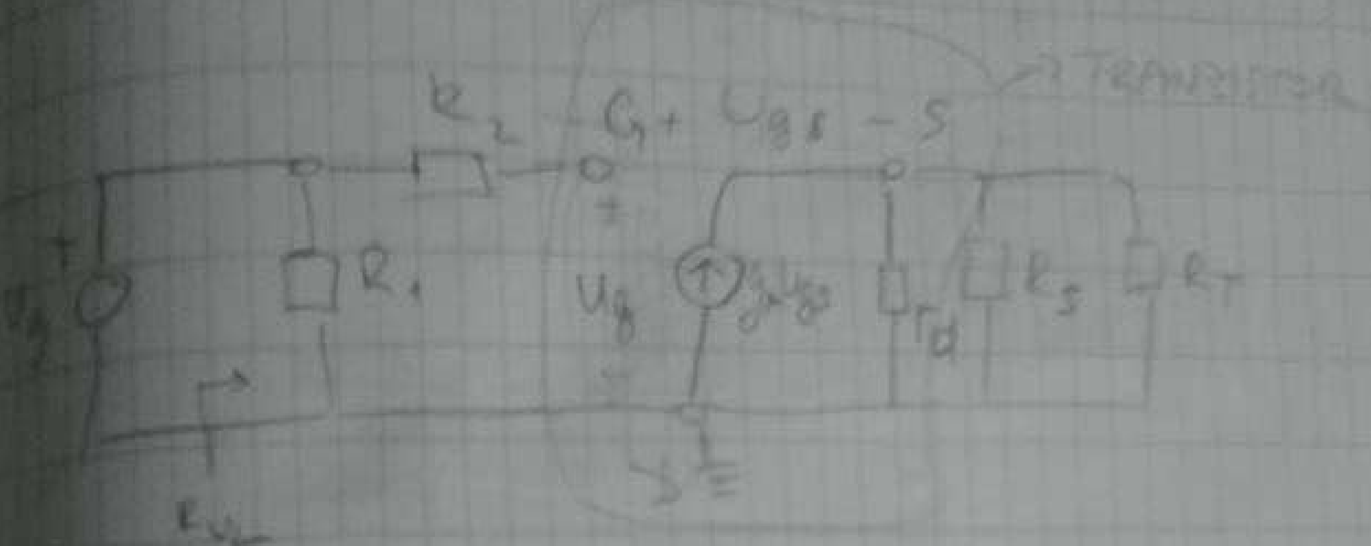
$U_{DSQ} = 10V$

$i_D = \frac{K}{2}(U_{GSQ} - U_{GS0})^2(1 + \lambda U_{DS})$

$g_m = \frac{\partial i_D}{\partial u_{GS}}\Big|_Q = 2,1\ \frac{mA}{V}$

$r_d = \frac{1}{\frac{\partial i_D}{\partial u_{DS}}}\Big|_Q = \frac{1}{\lambda I_{DQ}} = 200k\Omega$



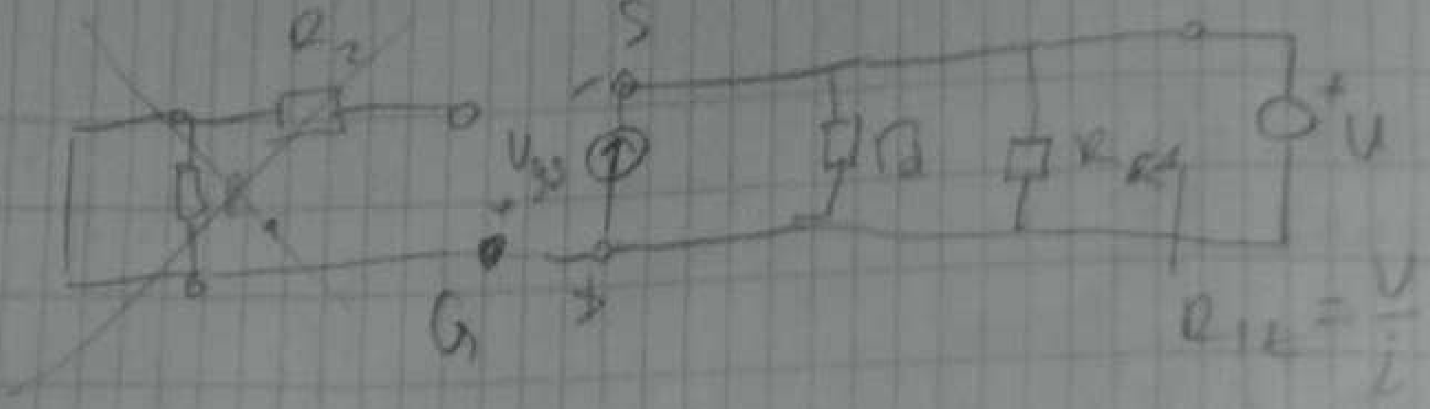

$$A_{vg} = \frac{U_{iz}}{U_g} = \frac{g_m \cancel{U_{gs}} (r_d \| R_S \| R_T)}{\cancel{U_{gs}} + g_m \cancel{U_{gs}} (r_d \| R_S \| R_T)} = 0{,}67$$

$$A_v > 0 \quad A_{vg} \approx 1 \quad A_{vg} < 1$$

$$G_{ug} = \frac{i_{iz}}{U_g} = 0{,}339 \, \frac{mA}{V}$$

$i_{iz} \rightarrow \frac{u_{iz}}{R_T}$

$$R_{ul} = R_1 = 56 \, k\Omega$$




$$i + g_m u_{gs} = \frac{u}{r_d \| R_s}$$

$$u_{gs} = -u$$

$$i - g_m u = \frac{u}{r_d \| R_s}$$

$$i = \frac{u}{r_d \| R_s} + \frac{u}{\frac{1}{g_m}}$$

$$\frac{1}{R_{iz}} = \frac{i}{u} = \frac{1}{r_d \| R_s} + \frac{1}{\frac{1}{g_m}}$$

$$R_{iz} = \frac{1}{g_m} \| r_d \| R_s = 0{,}384\ k\Omega$$

3.

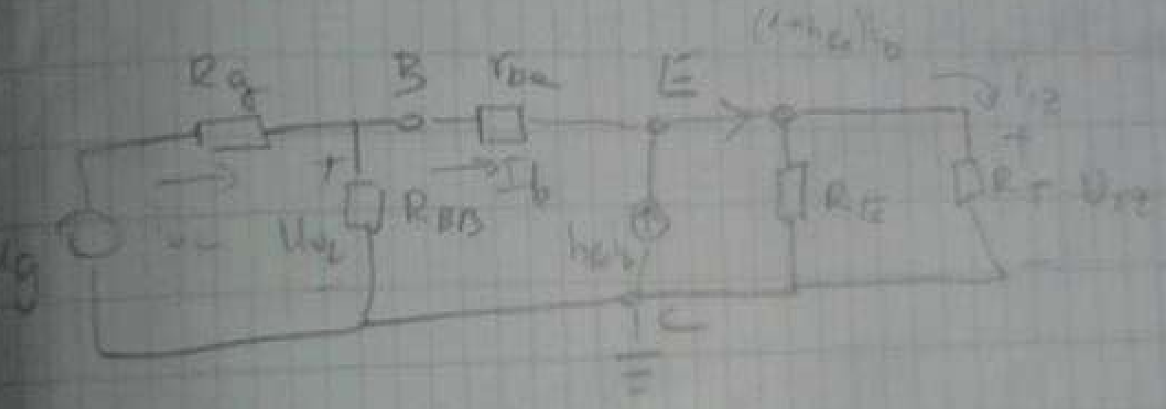
$$U_{BB} = U_{UL} \frac{R_2}{R_1 + R_2} = 6V$$

$$R_{BB} = R_1 \| R_2 = 28\,k\Omega$$

$$r_{be} = \frac{U_T}{I_{BQ}} \qquad I_{BQ} = \frac{U_{BB} - U_{BEQ}}{R_{BB} + (1+\beta)R_E}$$

$$I_{CQ} = \beta I_{BQ} \qquad U_{CEQ} = \ldots$$

$r_{ce} = \infty$ (zanemariti porast $I_C$ u NAP-u)




$$A_{vg} = \frac{u_{iz}\, u_{ul}}{u_{ul}\, u_g} = \frac{(1+h_{fe})\, i_b\, R_E \| R_T}{i_b r_{be} + (1+h_{fe})\, i_b\, R_E \| R_T} \cdot \frac{R_{ul}}{R_{ul} + R_g}$$

$$R_{ul} = \frac{u_{ul}}{i_{ul}} = \frac{R_{BB}\left(r_{be} + (1+h_{fe}) R_E \| R_T\right)}{R_{BB} + \ldots}$$

$$R_{ul} = R_{BB} \,\|\, \left(r_{be} + \underbrace{(1+h_{fe}) R_E \| R_T}_{R_{ul}'}\right)$$

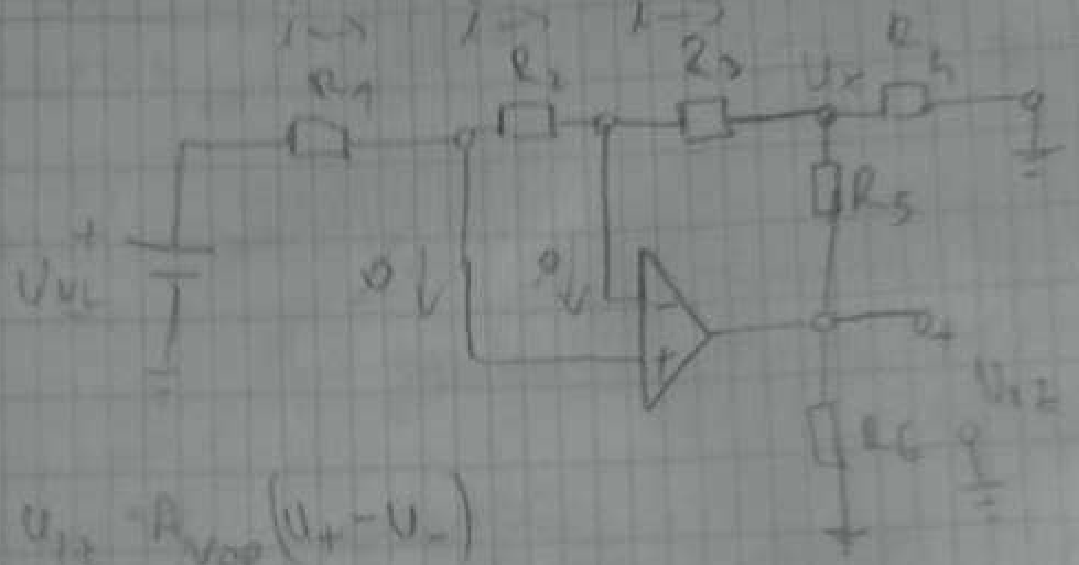
$\beta$ = $B$ ... pojačanje (1+ $h_{fe}$) puta

$= 0{,}7$

... $k\Omega$

$$R_{iz} = \frac{u}{i} = R_E \parallel \left( \frac{r_{be} + R_G \parallel R_{BB}}{1+h_{fe}} \right) = 70$$

4.



(1) $U_{iz} = A_{VOP}(U_+ - U_-)$

$$i = \frac{U_+ - U_-}{R_2} =$$

$$\frac{U_{UL} - U_x}{R_1 + R_2 + R_3} = \frac{U_x - U_{iz}}{R_5} + \frac{U_x}{R_4}$$

(2) $U_+ - U_- = iR_2$

(2) → (1) ⇒ $U_{iz} = A_{VOP}\, iR_2$