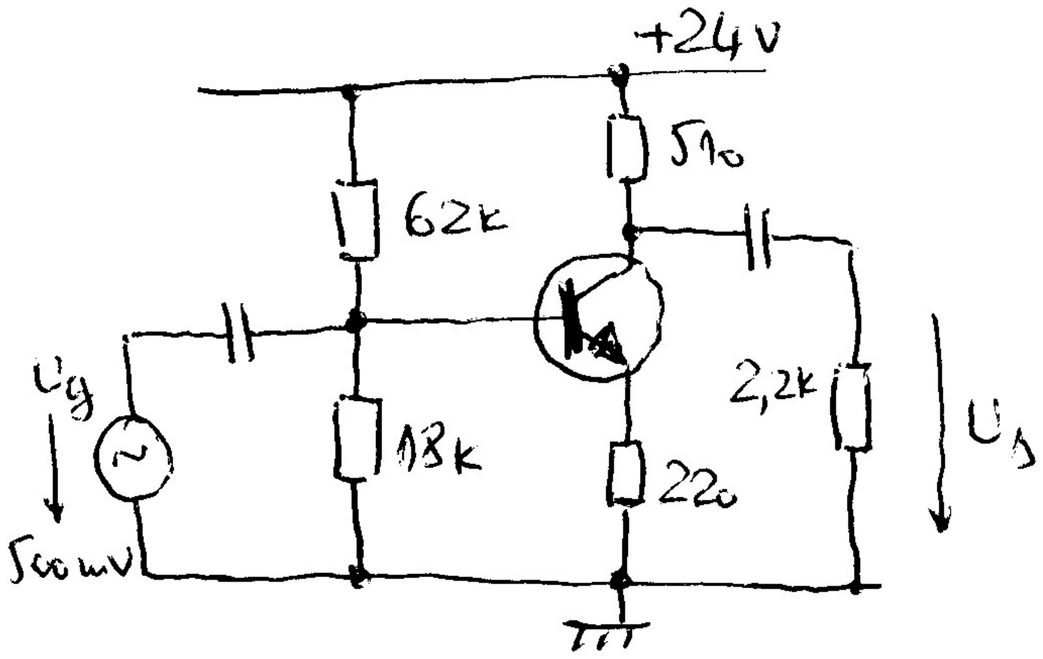
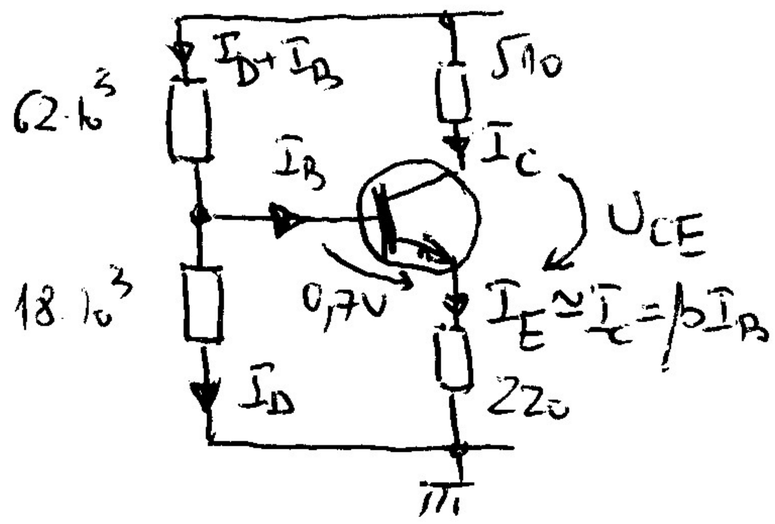


$\beta = 100$

Se cer I_C, U_{CE}
U_s

Ecuații de ochiuri

Schema echivalentă de c.c.



$$\begin{cases} 24 = (I_D + I_B)\,62 \cdot 10^3 + I_D \cdot 18\,10^3 \\ I_D \cdot 18 \cdot 10^3 = 0{,}7 + 22 \cdot 10^3 \cdot I_B \\ 24 = 510 \cdot I_C + U_{CE} + 22 \cdot I_C \end{cases}$$

Din prima 2 ecuații rezultă

$$24 = I_B \cdot 62\,10^3 + 80 \cdot 10^3 I_D$$

$$24 = I_B \cdot 62 \cdot 10^3 + 80 \cdot \frac{0{,}7 + 22 \cdot 10^3 I_B}{18}$$

$$= I_B \cdot 62 \cdot 10^3 + 4{,}4\,(0{,}7 + 22 \cdot 10^3 I_B)$$

$$24 - 3{,}08 = I_B \cdot 10^3 (62 + 97) \simeq 10^3 \cdot 160\, I_B$$

$$I_B = \frac{21}{160} \cdot 10^{-3} = 0{,}13 \text{ mA}$$

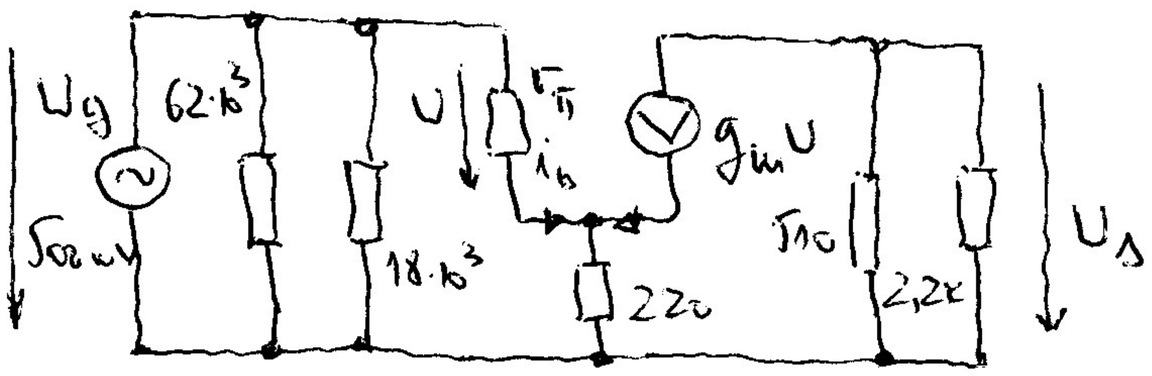
$$\boxed{I_C} = 100 \cdot 0{,}13 = \boxed{13 \text{ mA}}$$

din ec 3: $U_{CE} = 24 - 730 \cdot I_C$

$= 24 - 730 \cdot 13 \cdot 10^{-3}$

$$\boxed{U_{CE}} = 24 - 10{,}4 = \boxed{13{,}6 \text{ V}}$$

Schema echivalentă de c.a.



$$g_m = h_0 I_C = 40 \cdot 13 \cdot 10^{-3} = 0{,}52 \text{ S}$$

$$r_\pi = \frac{\beta}{g_m} = \frac{100}{0{,}52} \simeq 200\ \Omega$$

$$A_u = \frac{U_s}{U_g} = \frac{-g_m U \;\; 510 \parallel 2{,}2k}{U + (i_b + g_m U)\,22} =$$

$$= -\frac{g_m U \cdot 410}{U + \left(\frac{U}{r_\pi} + g_m U\right) \cdot 22}$$

$$A_U = -\frac{g_m \cdot 410}{1 + \frac{1 + g_m r_\pi}{r_\pi} \cdot 22} = \frac{-g_m r_\pi \cdot 410}{r_\pi + (1 + g_m r_\pi) \cdot 22}$$

$$= -\frac{\beta \cdot 410}{200 + (\beta + 1)\,22} \simeq -\frac{\beta \cdot 410}{\beta \cdot 22} \simeq 1{,}8$$

$$\boxed{U_s} \simeq -1{,}8 \cdot 500 \simeq \boxed{-900 \text{ mV}}$$