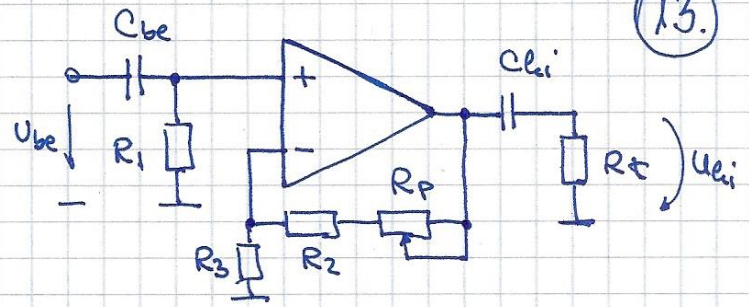
(13.)



$R_1 = 10k \quad R_2 = 10k \quad R_3 = 1k$

$R_t = 2{,}2k \quad R_P = 100k$

$f_a = 10{,}5\,Hz \quad U_{be} = 100\,\mu V$

a.) $A_{umin} = 1 + \frac{R_2 + R_{Pmin}}{R_3} = 1 + \frac{10k + 0}{1k} = \underline{\underline{11}}$

$A_{umax} = 1 + \frac{R_2 + R_{Pmax}}{R_3} = 1 + \frac{10k + 100k}{1k} = \underline{\underline{111}}$

b.) $U_{kimin} = U_{be} \cdot A_{umin} = 100\,\mu V \cdot 11 = \underline{\underline{1{,}1\,V}}$

$U_{kimax} = U_{be} \cdot A_{umax} = 100\,\mu V \cdot 111 = \underline{\underline{11{,}1\,V}}$

c.) $20 \lg \frac{U_{be}}{U_{ki}} = 2\,dB$

$\frac{U_{be}}{U_{ki}} = \frac{\sqrt{R^2 + X_C^2}}{R}$

$\frac{\sqrt{R^2 + X_C^2}}{R} = \sqrt[3]{2}$

$20 \lg \sqrt{2} = 3 \quad [dB]$

$\frac{2}{3} \cdot 20 \lg \sqrt{2} = 2$

$\Leftarrow \quad 20 \lg \sqrt[3]{2} = 2$

$R^2 + X_C^2 = \sqrt[3]{4} \cdot R^2 \Rightarrow X_C^2 \approx 0{,}6 R^2 \Rightarrow X_C \approx 0{,}77 R \Rightarrow$

$\Rightarrow \frac{1}{2\pi \cdot f_a \cdot C} = 0{,}77 \cdot R \Rightarrow f_a = \frac{1}{2\pi \cdot R \cdot C \cdot 0{,}77}$

$f_{abe} \Rightarrow C_{be} = \frac{1}{2\pi \cdot R_1 \cdot f_0 \cdot 0{,}77} = \frac{1}{2\pi \cdot 10k \cdot 10{,}5_{Hz} \cdot 0{,}77} \approx \underline{\underline{1{,}9\,\mu F}}$

$f_{aki} \Rightarrow C_{ki} = \frac{1}{2\pi \cdot R_t \cdot f_0 \cdot 0{,}77} = \frac{1}{2\pi \cdot 2{,}2k \cdot 10{,}5_{H} \cdot 0{,}77} \approx 1{,}9\,\mu F$

d.)