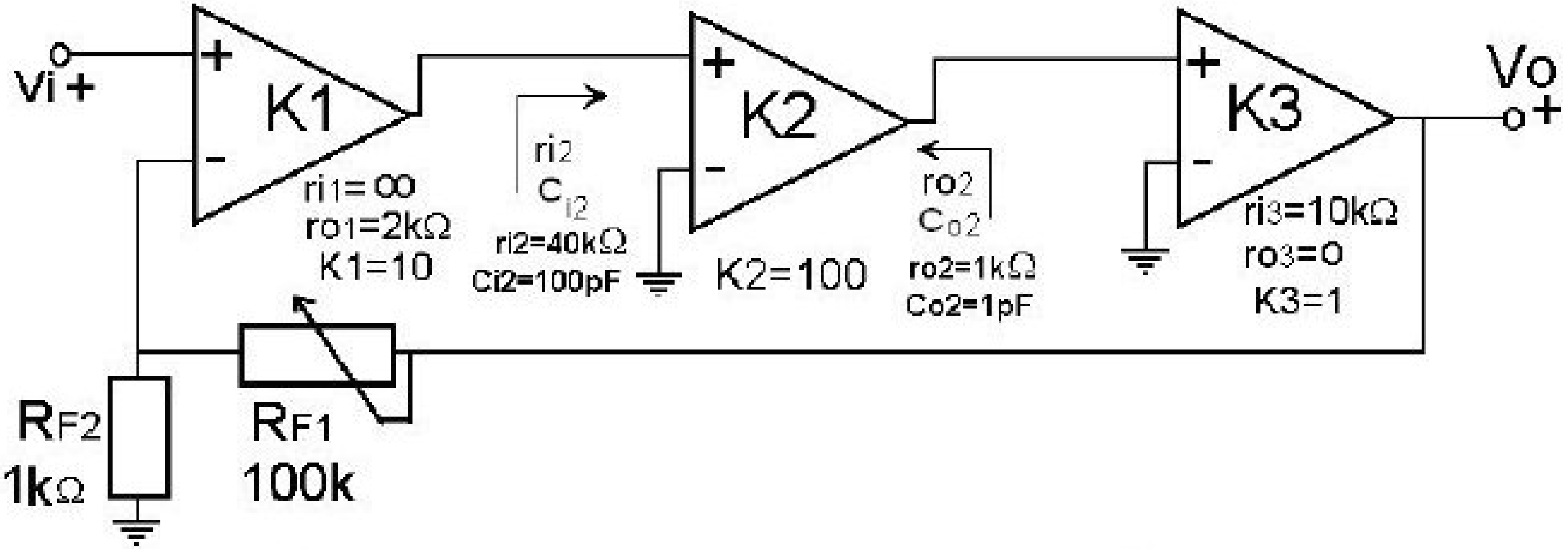


a) $A_f = ?$ $\xi = ?$ $F_{HC} = ?$

b) Find the necessary value of $R_{F1}$ for the maximum flatness.

CEVAP-2 : a) $K_0 = K_1 \cdot \frac{r_{i2}}{r_{o1}+r_{i2}} \cdot K_2 \cdot \frac{r_{i3}}{r_{o2}+r_{i3}} \cdot K_3 = 10 \cdot \frac{40}{42} \cdot 100 \cdot \frac{10}{11} \cdot 1$

$A_0$

$K_0 = 866$

$A$

$$K(s) = K_0 \frac{w_1 \cdot w_2}{(s+w_1)(s+w_2)}, \quad w_1 = \frac{1}{C_{i2}(r_{i2} // r_{o1})}, \quad w_2 = \frac{1}{C_{o2}(r_{o2} // r_{i3})}$$

$$w_1 = \frac{1}{100pF\,(2k // 40k)} = 5{,}25 \cdot 10^6 \text{ rad/s}, \quad w_2 = \frac{1}{1pF\,(1k // 10k)} = 1{,}1 \cdot 10^9 \text{ rad/s}$$

$A_F$

$$\beta = -\frac{R_{F2}}{R_{F1}+R_{F2}} = -\frac{1}{101} \Longrightarrow K_F(s) = \frac{K(s)}{1-\beta(s)K(s)} = \frac{K_0 \cdot 5{,}8 \cdot 10^5}{(s+5{,}25 \cdot 10^6)(s+1{,}1 \cdot 10^9) + \frac{5 \cdot 10^{18}}{101}}$$

$A_F$

$$K_F(s) = 89{,}6 \cdot \frac{5{,}58 \cdot 10^{16}}{s^2 + 1{,}1 \cdot 10^9 s + 5{,}58 \cdot 10^{16}} \Longrightarrow 2\xi w_0 = 1{,}1 \cdot 10^9, \quad w_0^2 = 5{,}6 \cdot 10^{16}$$

$$\Rightarrow w_0 = 236 \cdot 10^6 \longrightarrow \xi = 2{,}33$$

$\xi > \sqrt{3}$ (Baskın kutup) $\Longrightarrow F_{üst} = (1-\beta K_0) f_i = 8\,MHz$

(dominant pole)

veya $s^2 + 1{,}1 \cdot 10^9 s + 5{,}58 \cdot 10^{16} = \underbrace{(s+53{,}4 \cdot 10^6)(s+1043 \cdot 10^6)}$

$53{,}4 \cdot 10^6 \ll 1043 \cdot 10^6$ Baskın kutup

$F_{üst} \cong 8{,}5\,MHz$

(dominant pole)

$$1-\beta A_0 = \frac{(F_1+F_2)^2}{2F_1F_2}$$

$F_1 \ll F_2$

b) $-\beta \cong \frac{F_2}{2K_0 F_1} = 0{,}12 \quad \left(\xi = \frac{1}{\sqrt{2}}\right)$

$A_0$

$$\frac{R_{F2}}{R_{F1}+R_{F2}} = \frac{1k}{1k+R_{F1}} = \frac{1}{8{,}26} \Longrightarrow R_{F1} \cong 7{,}26\,k\Omega$$

$$w_0^2 = (1-\beta K_0) w_1 w_2 = \left(1 + \frac{866}{8{,}26}\right) 5{,}25 \cdot 10^6 \cdot 1{,}1 \cdot 10^9 \Longrightarrow F_0 = \frac{w_0}{2\pi} = \frac{782 \cdot 10^6}{2\pi} = 124\,MHz$$

$F_{üst} = 124\,MHz \quad (\xi = 1/\sqrt{2})$

$F_{HC}$