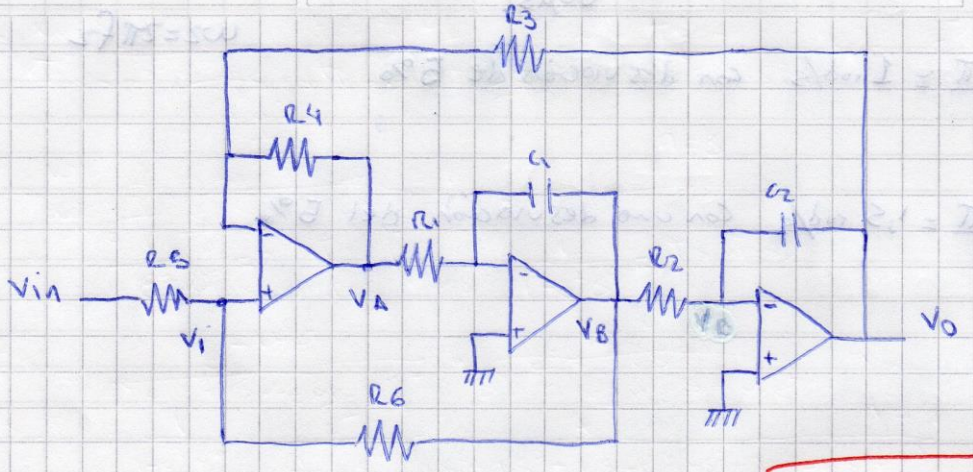


$R5 = R6 = R3 = R4 = 50K\Omega$

$(V_{in} - V_1)G5 = (V_1 - V_B)G6$

$V_{in} = 2V_1 - V_B$

$(V_A - V_1)G1 = (V_1 - V_O)G3$

$2V_1 = V_A + V_O$

$V_{in} = V_A + V_O - V_B$

$V_{in} = V_A + V_O + V_O \frac{SC_2}{G_2}$

$V_{in} = V_O \frac{S^2 C_1 C_2}{G_1 G_2} + V_O \frac{SC_2}{G_2} + V_O$

$V_{in} = V_O \left(\frac{S^2 C_1 C_2}{G_1 G_2} + \frac{SC_2}{G_2} + 1 \right)$

$V_{in} = V_O \left(\frac{S^2 C_1 C_2 + SC_2 G_1 + G_1 G_2}{G_1 G_2} \right)$

$\frac{V_O}{V_{in}} = \frac{G_1 G_2}{S^2 C_1 C_2 + SC_2 G_1 + G_1 G_2}$

$\frac{V_O}{V_{in}} = \frac{\frac{G_1 G_2}{C_1 C_2}}{S^2 + S\frac{G_1}{C_1} + \frac{G_1 G_2}{C_1 C_2}}$

$V_B G_2 = -V_O SC_2$

$V_B = -V_O \frac{SC_2}{G_2}$

$G_1 V_A = -V_B SC_1$

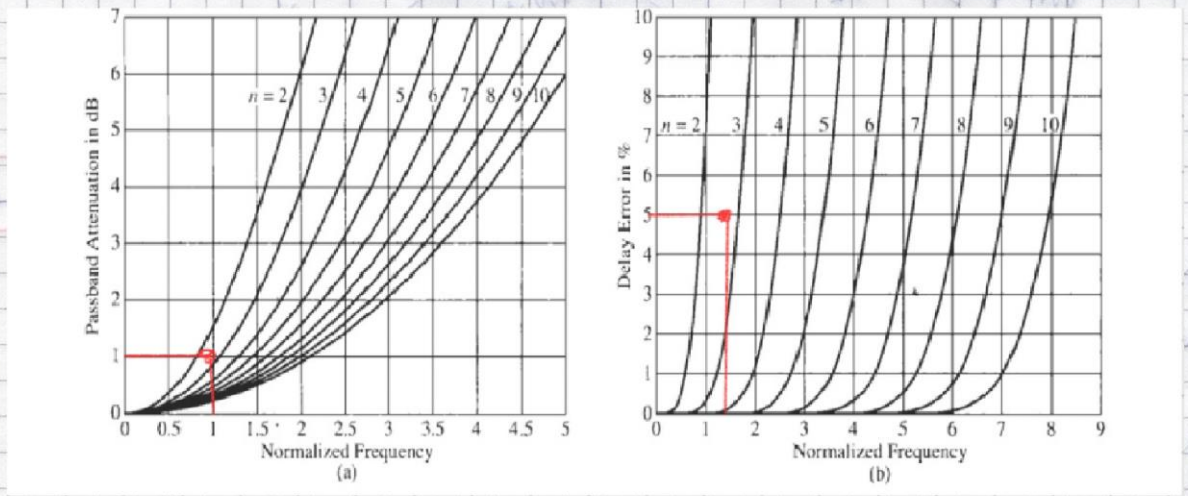
$V_A = V_O \frac{S^2 C_1 C_2}{G_1 G_2}$

Norma de Normalizacion $\Omega = \frac{1}{80\mu s} = 12{,}5K$ rad/s $\quad \omega_1 = 2\pi f_1$

$\omega_2 = 2\pi f_2$

$\omega_1' = \frac{2KHz \cdot 2\pi}{12{,}5K} = 1$ rad/s con

$\omega_2' = \frac{3KHz \cdot 2\pi}{12{,}5K} = 1{,}5$ rad/s con una desviación del 5%



$\omega_1' = 1 \Rightarrow n = 3$

$\omega_2' = 1{,}5 \Rightarrow n = 3$

$\coth g(s) = \frac{\cosh(s)}{\operatorname{Senh}(s)} = \frac{1}{s} + \cfrac{1}{\frac{3}{s} + \cfrac{1}{\frac{5}{s}}}$

$\coth g(s) = \frac{1}{s} + \frac{5s}{1s + s^2}$

$\frac{\cosh(s)}{\operatorname{Senh}(s)} = \frac{5s^2 + 1s + s^2}{s(s^2 + 1s)}$

$T(s) = \frac{15}{s^3 + 6s^2 + 15s + 15}$

$$T(s) = \frac{6,4224528}{(s^2+3,67781s+6,4224528)} \cdot \frac{2,32218}{(s+2,32218)}$$

$$T(s) = \frac{\frac{1}{C_1C_2R_1R_2}}{s^2 + s\left(\frac{1}{C_1R_1} + \frac{1}{C_1C_2R_1R_2}\right)}$$

$C_1 = C_2 = C$

$\frac{1}{CR_1} = 3,67781 \qquad C = 1$

$\frac{1}{C^2R_1R_2} = 6,4224528$

$R_1 = 0,2719\ \Omega$

$R_2 = 0,57265\ \Omega$

Desnormalizo en frecuencia

$C' = \frac{C}{\Omega} = \frac{1}{12,5K\omega_c} = 80\mu F$

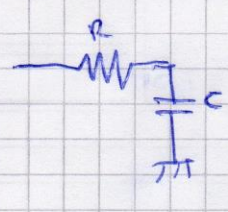
Cambiarlo los capacitores en unos de 1000pF y obtengo una nueva normalización

$\frac{C'}{Z_R} = C'' = 1000pF$

$Z_R = 80K\Omega$

$R_1' = R_1 \cdot Z_R = 0,2719\Omega \times 80K\Omega = 21,752K\Omega$

$R_2' = R_2 \cdot Z_R = 0,57265\Omega \times 80K\Omega = 45,812K\Omega$



$$\frac{\frac{1}{CR}}{s+\frac{1}{CR}} \qquad \frac{2,32218}{s+2,32218}$$

$$\frac{1}{CR} = 2,32218$$

$C = 1$

$R = 0,4308629$

Desnormalizo en frecuencia

$$C' = \frac{C}{\Omega} = \frac{1}{17,5k \cdot 10^4/s} = 80\mu F$$

Desnormalizo en impedancia

$$C'' = \frac{C'}{Z_\Omega} \Rightarrow 680pF = \frac{C'}{Z_\Omega} \Rightarrow Z_\Omega = \frac{80\mu F}{680pF} = 117,647k\Omega$$

$$R' = R \cdot Z_\Omega = 50,66k\Omega$$