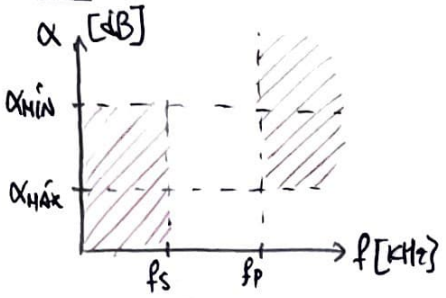
TS4



$f_p = 40$KHz
$f_s = 100$KHz → LP: $\omega_p = 1$, $\omega_s = (f_s/f_p)^{-1} = 4$
$\alpha_{MÁX} = 1$dB
$\alpha_{MÍN} = 30$dB

LP. MP: $\varepsilon^2 = 10^{\alpha_{MAX}/10} - 1 = 0,2589$ $\quad \alpha_{MÍN} = 10\log(1+\varepsilon^2 \cdot \omega_s^{2N})$ → N=3: $\alpha_{MÍN} = 30,259$ dB

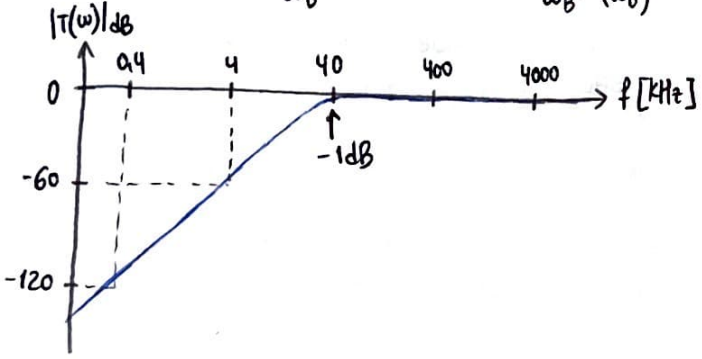
BW. N=3: $T(\$) = \frac{1}{\$+1} \cdot \frac{1}{\$^2+\$.2\cos(\frac{\pi}{3})+1}$ $\quad \omega_B = \varepsilon^{-1/N} = 1,2526$

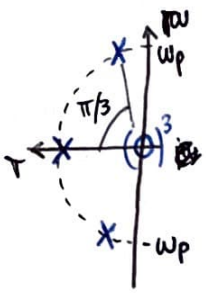
→ Volviendo a M.P.: $T(\$) = \frac{\omega_B}{\$+\omega_B} \cdot \frac{\omega_B^2}{\$^2+\$.2\cos(\frac{\pi}{3}).\omega_B+\omega_B^2}$

H.P: $\$ = 1/s \Rightarrow T(s) = \frac{\omega_B}{(\frac{1}{s})+\omega_B} \cdot \frac{\omega_B^2}{(\frac{1}{s})^2+(\frac{1}{s}).2\cos(\frac{\pi}{3}).\omega_B+\omega_B^2} = \frac{s}{s+\frac{1}{\omega_B}} \cdot \frac{s^2}{s^2+s.\frac{2\cos(\pi/3)}{\omega_B}+(\frac{1}{\omega_B})^2}$

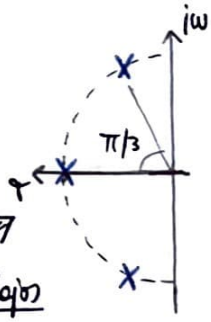
Desnormalización: $s = \frac{s}{\omega_p}$ → $\omega_p = 2\pi f_p = 251,327$ Krad/s

$\Rightarrow T(s) = \frac{s}{s+\frac{\omega_p}{\omega_B}} \cdot \frac{s^2}{s^2+s.2\cos(\pi/3).\frac{\omega_p}{\omega_B}+(\frac{\omega_p}{\omega_B})^2} = \frac{s}{s+200,644.10^3} \cdot \frac{s^2}{s^2+s.200,644.10^3+40,259.10^9}$

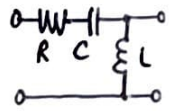




Pasa Altos

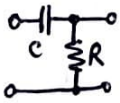


Pasa Bajos



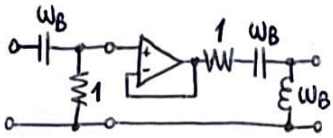
$T(s) = \frac{sL}{sL+R+1/sC} = \frac{s^2}{s^2+\frac{R}{L}s+\frac{1}{LC}} = \frac{s^2}{s^2+s.\frac{2\cos(\pi/3)}{\omega_B}+(\frac{1}{\omega_B})^2}$

$\begin{cases} \frac{R}{L} = \frac{1}{\omega_B} \Rightarrow R=1;\ L=\omega_B \\ \omega_B^2 = LC \Rightarrow C = \omega_B \end{cases}$



$T(s) = \frac{R}{R+1/sC} = \frac{s}{s+1/RC} = \frac{s}{s+1/\omega_B}$ → $\begin{cases} \omega_B = RC \Rightarrow R=1;\ C=\omega_B \end{cases}$

⇒ Circuito normalizado:



GIC: $z_i = \frac{Y_2Y_4}{Y_1Y_3Y_5}$ ⇝ $Y_2 = \$C$ con $C = \omega_B$ (Busco reemplazar $z_L = \$\omega_B$) → Resto de las admitancias $G=1$