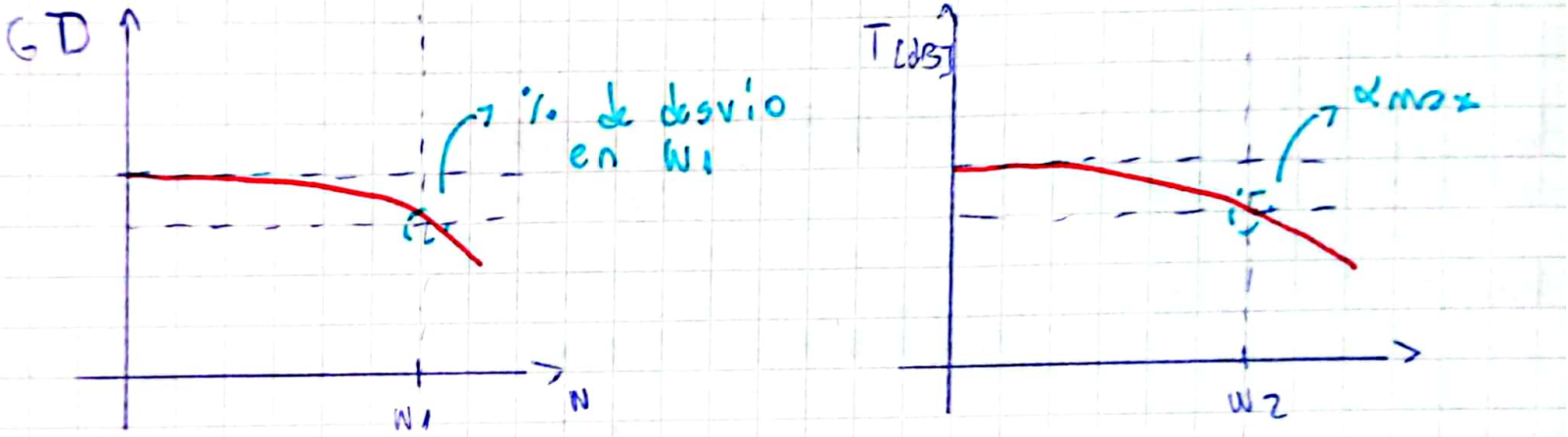
Ejercicio 6 TP2:

Retardo constante $T = 100\mu s = D$

$\%T = 10\%$ @ $W_1 = 25K\,r/s$

$\alpha_{max} = 1dB$ @ $10K\,r/s$



- Busco norma de frecuencia:

$$\Omega w = \frac{1}{D} = 10K\,r/s \Rightarrow W_1' = 2,5 \;,\; W_2' = 1$$

- Restricción de $\%T \Rightarrow n = 4 \quad (W_1' = 2,5)$
- Restricción de $\alpha_{max} \Rightarrow n = 3 \quad (W_2' = 1)$
- Orden 4, tomo el más exigente

$$n=4 \rightarrow \operatorname{cotgh}(s) = \frac{1}{s} + \cfrac{1}{\frac{3}{s} + \cfrac{1}{\frac{5}{s} + \cfrac{1}{\frac{7}{s}}}} = \frac{1}{s} + \cfrac{1}{\frac{3}{s} + \cfrac{1}{\frac{5}{s} + \frac{s}{7}}}$$

$$\operatorname{cotgh}(s) = \frac{1}{s} + \frac{1}{\frac{3}{s} + \frac{7s}{s^2+35}} = \frac{1}{s} + \frac{s(s^2+35)}{3(s^2+35)+7s^2}$$

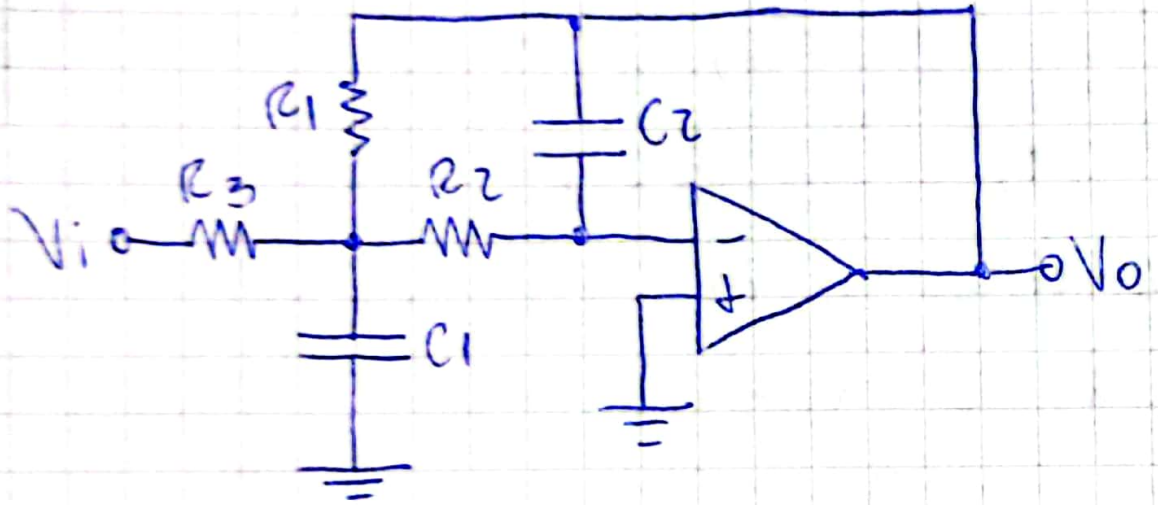
$$= \frac{3(s^2+35)+7s^2+s^2(s^2+55)}{3s(s^2+35)+7s^3} = \frac{3s^2+105+7s^2+s^4+35s^2}{3s^3+105s+7s^3}$$

$$H_{54}(s) = \frac{B_4(0)}{B_4(s)} = \frac{105}{s^4+10s^3+45s^2+105s+105}$$

$$H_{54}(s) = \frac{11,487}{(s^2+s4,707+11,487)} \quad \frac{9,14}{(s^2+s5,292+9,14)}$$

SOS 1 SOS 2

- Implementación MFB pasabajo:



$$T(\$) = \frac{\frac{1}{R_2 R_3 C_1 C_2}}{\$^2 + \$\frac{1}{C_1}\left(\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_3}\right) + \frac{1}{R_2 R_3 C_1 C_2}}$$

$$\frac{W_0}{Q} = \frac{1}{C_1}\left(\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_3}\right) \; ; \; W_0^2 = \frac{1}{R_2 R_3 C_1 C_2}$$

$$W_0 = 1 \Rightarrow \frac{1}{Q} = \frac{1}{C_1}\left(\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_3}\right) \; ; \; R_2 R_3 C_1 C_2 = 1$$

$$R_1 = R_2 = R_3 = R \; , \; \Omega_z = R \Rightarrow \frac{1}{Q} = \frac{1.3}{C_1} \; ; \; C_1 = \frac{1}{C_2}$$

$$C_1 = Q.3 \quad C_2 = \frac{1}{5Q}$$

Con $w_0 \neq 1$: $C_1 = \frac{3Q}{w_0}$; $C_2 = \frac{w_0^2}{3Q} \cdot \frac{1}{\frac{3Q}{w_0} \cdot w_0^2} = \frac{1}{3Q w_0}$

T1: $Q = 0,805$

$w_0^2 = 11,487$

$w_0 = 3,589$

$C_1 = 0,712$ ✓ $C_2 = \cancel{4,756}\ 0,122$ ✓ $\cancel{0,036}$

T2: $Q = 0,522$

$w_0^2 = 9,14$

$w_0 = 3,023$

$C_1 = 0,518$ ✓ $C_2 = \cancel{5,836}\ 0,211$ ✓ $\cancel{0,0698}$