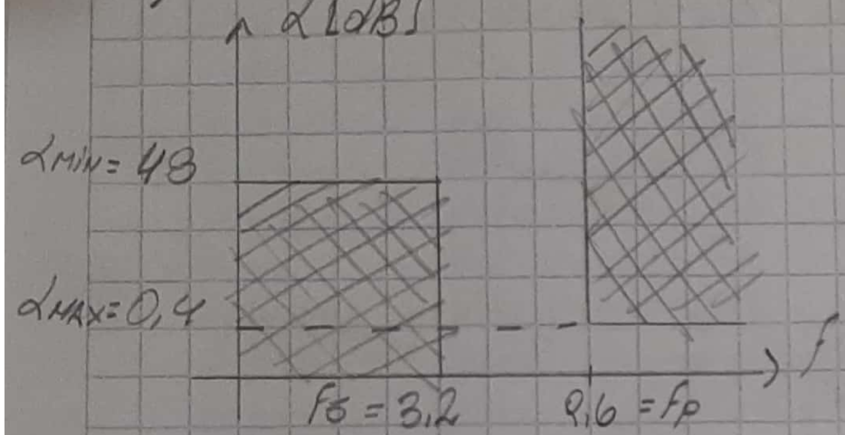
5)



$\omega_p = 1$

$\omega_s = 1/3 = 0,333$

a) Para el FLP prototipo

$\omega_{p_{LP}} = \dfrac{1}{\omega_{p_{HP}}} = 1$

$\omega_{s_{LP}} = \dfrac{1}{\omega_{s_{HP}}} = 3$

$\xi^2 = 10^{\frac{\alpha_{MAX}}{10}} - 1 = 0,096$

Me fijo que tipo de filtro cumple el α_{MIN} con el menor orden

Un Bessel para una $\omega_s = 3$ no llega a α_{MIN} tan grandes así que queda descartado

→ Tabla del Sch. Cap X. Pag 413

NOTA $\boxed{16:35}$ → $\boxed{17:20}$

HOJA N° 9

FECHA

Butter

$\alpha_{MIN_N} = 10\log(1+\epsilon^2\omega_s^{2N})$

$\alpha_{MIN_2} = 9{,}43\,dB$

$\alpha_{MIN_3} = 18{,}51\,dB$

$\alpha_{MIN_4} = 28\,dB$

$\alpha_{MIN_5} = 37{,}53$

cheby

$\alpha_{MIN_N} = 10\log[1+\epsilon^2\cosh^2(n\cdot\cosh^{-1}\omega_s)]$

$\alpha_{MIN_2} = 14{,}58\,dB$

$\alpha_{MIN_3} = 29{,}74\,dB$

$\alpha_{MIN_4} = 45\,dB$

$\alpha_{MIN_5} = 60{,}35\,dB$

$\Rightarrow$ lo cumple un cheby de orden 5

$$|T_{C_5}(j\omega)| = \frac{1}{1+\epsilon^2 C_5^2} \Rightarrow$$

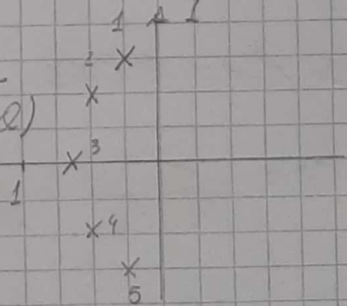
$$\Rightarrow |T_{C_5}(s)| = \frac{0{,}2}{s^5+s^4 1{,}25+s^3 2{,}03+s^2 1{,}43+s\,0{,}82+0{,}2}$$

Polos: $P_{1,5} = -0{,}12 \pm j1{,}1$

$P_{2,4} = -0{,}31 \pm j0{,}63$

$P_5 = -0{,}386$

polos más cercanos al eje $j\omega$ (mayor Q) y tienen distinto ω_0



$$|T_{C_5}(s)| = \frac{1{,}1}{s^2+s\,0{,}24+1{,}1}\cdot\frac{0{,}493}{s^2+s\cdot 0{,}62+0{,}493}\cdot\frac{0{,}386}{s+0{,}386}$$

$$T_{C_{5HP}}(s) = T_{C_{5LP}}(1/s)$$

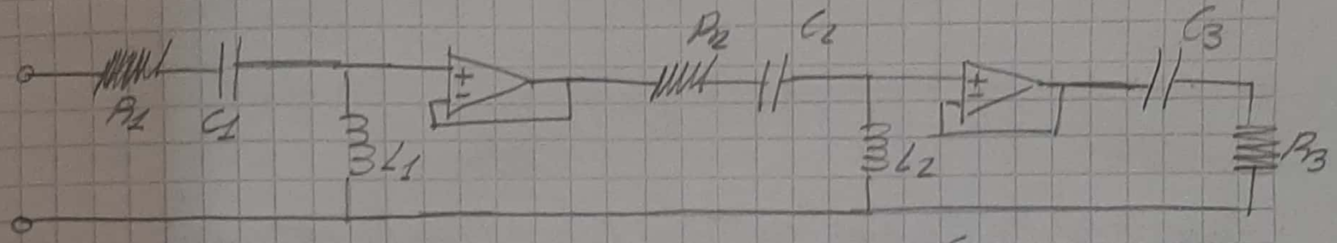
$$\Rightarrow T_{C_{5HP}}(s) = \frac{1{,}1}{1/s^2+1/s\,0{,}24+1{,}1}\cdot\frac{0{,}493}{1/s^2+1/s\,0{,}62+0{,}493}\cdot\frac{0{,}386}{1/s+0{,}386}$$

$$T_{C_{5HP}}(s) = \frac{s^2}{s^2+s\frac{0{,}24}{1{,}1}+\frac{1}{1{,}1}}\cdot\frac{s^2}{s^2+s\frac{0{,}62}{0{,}493}+\frac{1}{0{,}493}}\cdot\frac{s}{s+\frac{1}{0{,}386}}$$

$$T_{C_{5HP}}(s) = \frac{s^2}{s^2+s\cdot 0{,}218+0{,}91}\cdot\frac{s^2}{s^2+s\cdot 1{,}258+2{,}03}\cdot\frac{s}{s+2{,}59}$$

NOTA 5:20 $\longrightarrow$ 17:00

Escaneado con CamScanner



$$H_1(s) = \frac{s^2}{s^2 + s\,R_1/L_1 + 1/L_1C_1} = \frac{s^2}{s^2 + 0{,}218 + 0{,}91}$$

$$\begin{cases} R_1/L_1 = 0{,}218 \\ 1/L_1C_1 = 0{,}91 \end{cases}$$

uso como $R_Z = R_1 = R_2 = R_3 = R \Rightarrow R_1 = 1$

$$\Rightarrow L_1 = 1/0{,}218 = 4{,}59 \quad y \quad C_1 = \frac{1}{L_1 \cdot 0{,}91} = 0{,}24$$

$$H_2(s) = \frac{s^2}{s^2 + s\,R_2/L_2 + 1/L_2C_2} = \frac{s^2}{s^2 + s\,1{,}258 + 2{,}03} \Rightarrow \begin{cases} R_2/L_2 = 1{,}258 \\ 1/L_2C_2 = 2{,}03 \end{cases}$$

$$L_2 = 1/1{,}258 = 0{,}795 \quad y \quad C_2 = \frac{1}{L_2 \cdot 2{,}03} = 0{,}62$$

$$H_3 = \frac{s}{s + 2{,}59} = \frac{s}{s + 1/R_3C_3} \qquad 1/R_3C_3 = 2{,}59 \Rightarrow C_3 = \frac{1}{2{,}59} = 0{,}386$$

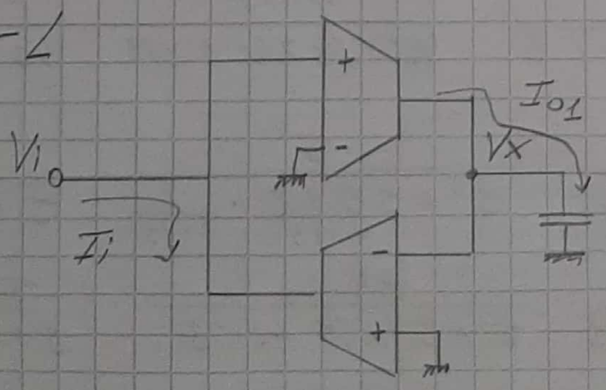
$$\text{Si } R_Z = 2{,}2\,k\Omega \Rightarrow L_1 = \frac{L_1'}{\Omega_w} \cdot R_Z = \frac{4{,}59}{2\pi \cdot 9{,}6\,kHz} \cdot 2{,}2\,k\Omega = 167{,}4\,mHy$$

$$C_1 = \frac{C_1'}{\Omega_w \cdot R_Z} = \frac{0{,}24}{2\pi \cdot 9{,}6\,kHz \cdot 2{,}2\,k\Omega} = 1{,}8\,nF$$

$$L_2 = \frac{L_2'}{\Omega_w} \cdot R_Z = 29\,mHy \qquad C_2 = \frac{C_2'}{\Omega_w \cdot R_Z} = 4{,}67\,nF$$

$$C_3 = \frac{C_3'}{\Omega_w R_Z} = 2{,}91\,nF$$

OTA-L



$$Z_i = \frac{sC}{gm^2}$$

$$\Rightarrow L = C/gm^2$$

(como defino el gm?)

NOTA

Escaneado con CamScanner