

6)  $\omega_1 = 25 \text{ krad/s}$     $\omega_2 = 10 \text{ k}$     $\tau = 100 \mu\text{s}$     $\tau_w = \frac{1}{100 \mu\text{s}} = 10 \text{ k}$   
 $\rightarrow \omega_1 = 2,5$     $\omega_2 = 1$     $\text{Retardos max} = 10\% = 0,1$     $\alpha_{\text{max}} = 7 \text{ dB}$

De la primer gráfica:  $m = 4$  de la segunda  $m = 3$

El filtro Bessel de orden 4:  $H(s) =$

$$C(s) = \frac{1}{s} + \frac{1}{\frac{3}{s} + \frac{1}{\frac{5}{s} + \frac{1}{\frac{5}{s} + \frac{1}{s}}}} = \frac{1}{s} + \frac{1}{\frac{3}{s} + \frac{5,7}{s^2 + 35}}$$

$$= \frac{1}{s} + \frac{s^3 + 35s}{10s^2 + 105} = \frac{84 + s^2 + 45 + 105}{70s^3 + 705s}$$

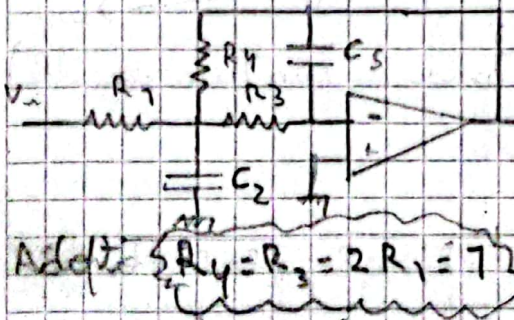
$$H(s) = \frac{105}{s^4 + 10s^3 + 45s^2 + 105s + 105}$$

Polos:  $X_{1,2} = -2,103 \pm j2,657$     $X_{3,4} = -2,896 \pm j0,667$

$$H(s) = \frac{11,48}{(s^2 + s \cdot 4,206 + 11,48)} \cdot \frac{9,138}{(s^2 + s \cdot 5,8 + 9,138)}$$

$K_1 = K_2 = 1$     $\omega_1 = 3,38$     $\omega_2 = 3,02$     $Q_1 = 0,803$     $Q_2 = 0,516$

Diseño con MFB:  $H(s) = \frac{R_1 R_2 C_2 C_5}{s^2 \left( \frac{1}{R_1} + \frac{1}{R_3} + \frac{1}{R_4} \right) C_2 + \frac{1}{R_3 R_4 C_2 C_5}}$



$$K = \frac{R_4}{R_1}$$

$$\omega_0 = \frac{1}{\sqrt{R_3 R_4 C_2 C_5}}$$

$$Q = \frac{1}{\sqrt{\frac{R_4 C_5}{R_3 C_2} + \frac{R_3 C_5}{R_4 C_2}}} \cdot \frac{1}{R_1} \cdot \frac{R_3 R_4 C_5}{C_2}$$

$k = 2$     $\omega_0 = \frac{1}{R \sqrt{C_2 C_5}} = \frac{1}{\sqrt{C_2 C_5}}$     $Q = \frac{1}{\frac{C_5}{C_2} + \frac{C_5}{C_2} + \frac{4R^2}{R_1} \frac{C_5}{C_2}} = \frac{C_2}{\sqrt{C_5}} \cdot \frac{1}{4}$

Primer LP:  $\omega_1 = 3,38$     $Q_1 = 0,803$

$$\frac{C_2}{C_5} = (4 \cdot 0,803)^2 \rightarrow C_2 = 10,37 C_5 \quad C_5 = \frac{1}{3,38 \sqrt{10,37}} = 92 \text{ nF}$$

Segundo LP:  $\omega_2 = 3,02$     $Q_2 = 0,516$

$$\frac{C_2}{C_5} = (4 \cdot 0,516)^2 \rightarrow C_2 = 4,26 C_5 \quad C_5 = \frac{1}{3,02 \sqrt{4,26}} = 0,76 \text{ F}$$