7) Formar un Pasabanda con la misma Topología

Mirando el Schaumann, me doy cuenta de usando la misma topología, cambiando la salida, obtengo un pasabanda.

Ahora $T(s) = \frac{V_2}{V_i}$ (Ver circuito del punto 1)

$V_i \cdot G_1 + V_2 \cdot (sC + G_2) + V_0 \cdot G_3 = 0 \quad (1)$

$V_2 \cdot G_3 = -V_3 \cdot sC \;;\; V_3 = -V_2 \cdot G_3 / sC \quad (2)$

$V_0 \cdot \cancel{G_4} = -V_3 \cdot \cancel{G_4} \;;\; V_0 = -V_3 \quad (3)$

(3) en (2) $\Rightarrow V_0 = +V_2 \cdot \frac{G_3}{sC} \quad (4)$

(4) en (1) $\Rightarrow V_i \cdot G_1 + V_2 \cdot (sC + G_2) + V_2 \cdot \frac{G_3}{sC} G_3 = 0$

$V_i \cdot G_1 + V_2 \left(sC + G_2 + \frac{G_3{}^2}{sC} \right) = 0$

$V_i \cdot G_1 + V_2 \frac{s^2C^2 + sCG_2 + G_3{}^2}{sC} = 0$

$V_i = -V_2 \cdot \frac{s^2C^2 + sCG_2 + G_3{}^2}{sCG_1} \;;\; \frac{V_2}{V_i} = \frac{-sCG_1}{s^2C^2 + sCG_2 + G_3{}^2}$

$$T(s) = \frac{-s\cancel{C}G_1}{C^{\cancel{2}}\left(s^2 + s \cdot \frac{G_2}{C} + \frac{G_3{}^2}{C^2}\right)}$$

$$T(s) = -\frac{s \cdot \frac{1}{CR_1} \cdot \frac{R_3}{R_3}}{s^2 + s \cdot \underbrace{\frac{1}{CR_2}}_{\omega_0/Q} + \underbrace{\frac{1}{C^2R_3{}^2}}_{\omega_0{}^2}} = \frac{-s \cdot \overbrace{\frac{R_3}{R_1}}^{K}}{s^2 + s \cdot \frac{\omega_0}{Q} + \omega_0{}^2}$$

$$\boxed{T(s) = \frac{-s \cdot K \cdot \omega_0}{s^2 + s \cdot \frac{\omega_0}{Q} + \omega_0{}^2}} \Rightarrow \boxed{T(s) = \frac{s(-K)}{s^2 + s \cdot \frac{1}{Q} + 1}}$$

Transferencia Normalizada. La Red NO cambia

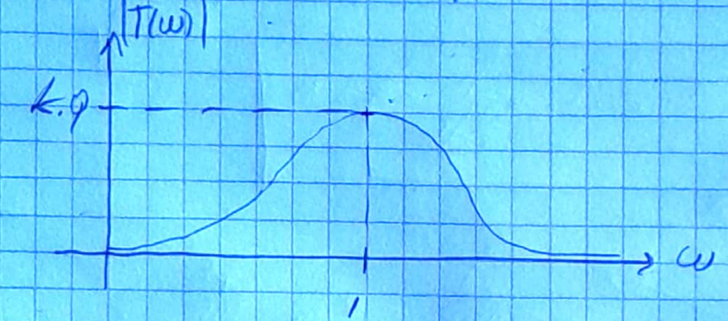
Manteniendo los valores originales, $Q = 3$ y $K = 10$

$$\Rightarrow \boxed{T(s) = \frac{-s \cdot 10}{s^2 + s/3 + 1}}$$

Respuesta de Módulo y Fase Aproximada del Pasa Banda

$$T(\$) = \frac{\$.(-k)}{\$^2 + \$.\frac{1}{\varphi} + 1} \quad \text{(Transferencia Normalizada)}$$

$$|T(\omega)| = \left|T(\$)\big|_{\$=j\omega}\right| = \frac{|j\omega(-k)|}{\left|-\omega^2 + j\frac{\omega}{\varphi} + 1\right|} = \frac{k.\omega}{\left|(1-\omega^2) + j.\frac{\omega}{\varphi}\right|}$$



$$T(\omega)\big|_{\omega=\emptyset} = \emptyset$$

$$T(\omega)\big|_{\omega=\omega_0=1} = k.\varphi$$

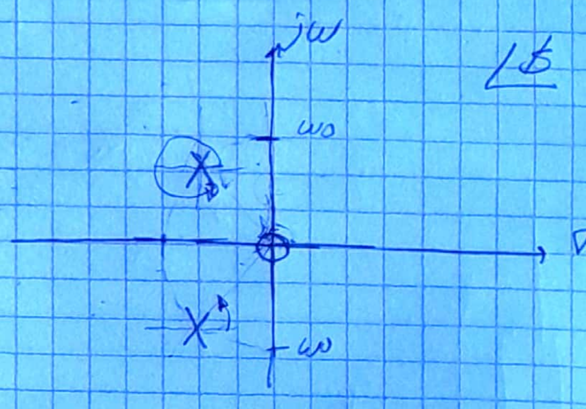
$$T(\omega)\big|_{\omega\to\infty} = \emptyset$$

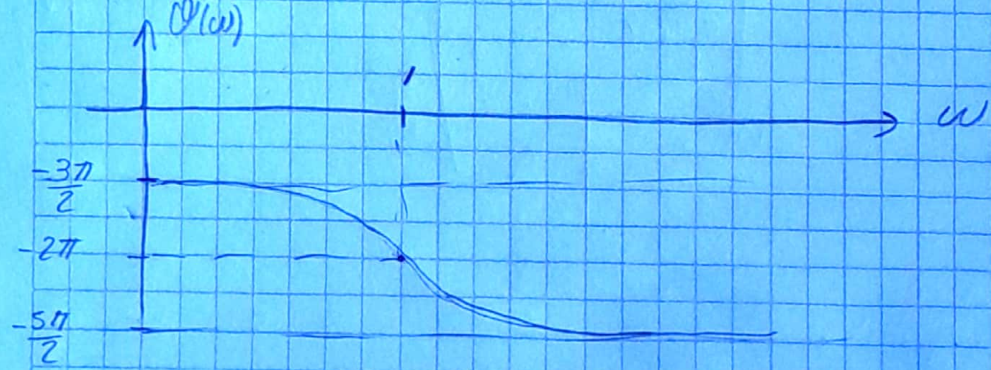
$$k = 10,\ \varphi = 3 \Rightarrow T(\omega)\big|_{\omega=\omega_0=1} = 30 = 29{,}54\ dB$$

$$\theta(\omega)\big|_{\omega=\emptyset} = \underbrace{\frac{\pi}{2}}_{\text{ceros}} - \underbrace{2\pi}_{\text{polos}} = -\frac{3\pi}{2}$$

$$\theta(\omega)\big|_{\omega=\omega_0=1} = \text{Mitad de excursión} = -2\pi$$

$$\theta(\omega)\big|_{\omega\to\infty} = \underbrace{\frac{\pi}{2}}_{\text{ceros}} - \left(\frac{5\pi}{2} + \frac{\pi}{2}\right) = -\frac{5\pi}{2}$$





NOTA