TC

TP 7

4) $\left|\frac{V_2}{V_1}(j\omega)\right| = \sqrt{\frac{k^2}{1+w^6}} \rightarrow$ Butter $\Rightarrow T_{(s)} = \frac{K}{s^3+2s^2+2s+1}$

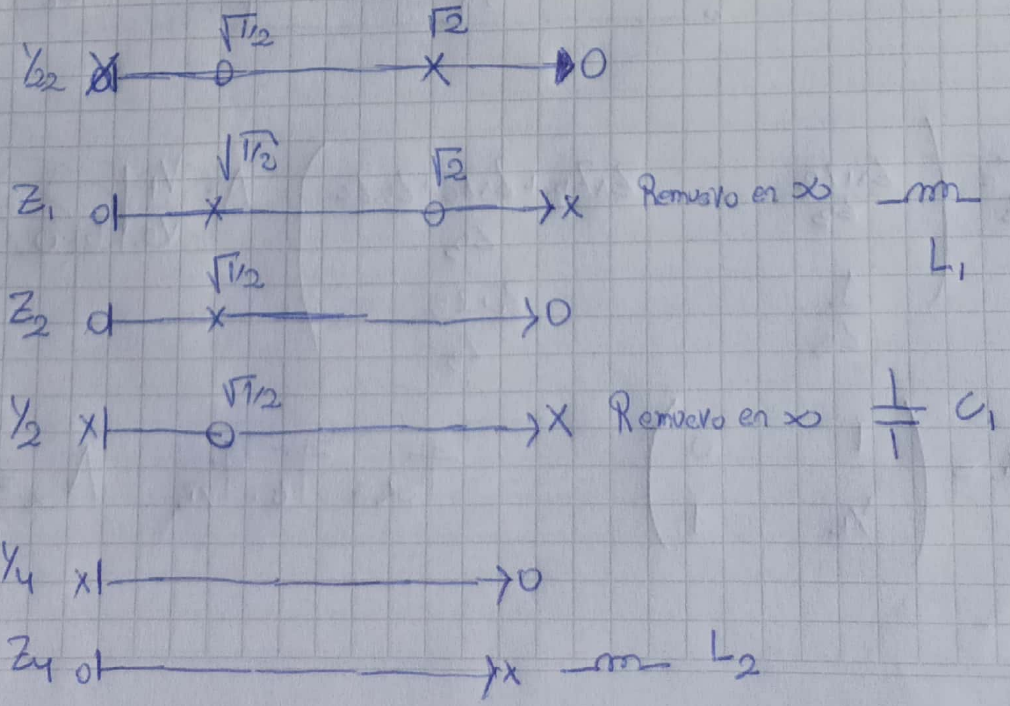
$T_{(s)} = \frac{P}{Q} = \frac{-Y_{21} R_L}{1+Y_{22} R_L}$ Como P es ~~impar~~ saco factor común la parte impar

$T = \frac{\frac{K}{s^3+2s}}{1+\frac{2s^2+1}{s^3+2s}}$ con R_L normalizado

$Y_{21} = \frac{K}{s^3+2s}$ $\quad Y_{22} = \frac{2s^2+1}{s^3+2s} = \frac{2(s^2+1/2)}{s(s^2+2)}$

$\downarrow$

3 ceros en ∞



$\cancel{Y_{ab}} = Y_1 = \dfrac{2(s^2+1/2)}{s(s^2+2)}$ $\qquad \cancel{\lim_{s\to\infty} \dfrac{Y_1}{s}} =$

$Z_1 = \dfrac{s(s^2+2)}{2(s^2+1/2)} \qquad \lim_{s\to\infty} \dfrac{Z_1}{s} = \dfrac{\cancel{s}(s^2+2)}{2(s^2+1/2)\cdot \cancel{s}} = \dfrac{1}{2} = K_{\infty 1}$

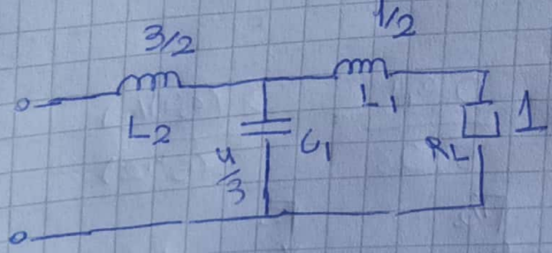
$Z_2 = Z_1 - s\dfrac{1}{2} = \dfrac{s(s^2+2)}{2(s^2+1/2)} - s\dfrac{1}{2} = \dfrac{\cancel{s^3} + 2s - \cancel{s^3} - 1/2\, s}{2(s^2+1/2)}$

$Z_2 = \dfrac{3}{2.2} \dfrac{s}{(s^2+1/2)}$

$Y_2 = \dfrac{4}{3} \dfrac{(s^2+1/2)}{s} \qquad \lim_{s\to\infty} \dfrac{4}{3} \dfrac{(s^2+1/2)}{s\,.\,s} = \dfrac{4}{3} = K_{2\infty}$

$Y_4 = Y_2 - s\dfrac{4}{3} = \dfrac{4}{3}\dfrac{(s^2+1/2)}{s} - s\dfrac{4}{3} = \dfrac{\cancel{4s^2} + 2 - \cancel{4s^2}}{3s} = \dfrac{2}{3s}$

$Z_4 = \dfrac{3}{2} \cdot s$



$Z_A = sL_2 \quad Z_B = \dfrac{1}{sC_1}$

$Z_C = sL_1$

$T_t = \begin{pmatrix} \dfrac{Z_A+Z_B}{Z_B} & \dfrac{Z_AZ_B + Z_AZ_C + Z_BZ_C}{Z_B} \\ \dfrac{1}{Z_B} & \dfrac{Z_C+Z_B}{Z_B} \end{pmatrix}$ $\quad A = \dfrac{V_1}{V_2}\Big|_{I_2=0} \Rightarrow T = A^{-1} = \dfrac{Z_B}{Z_A+Z_B}$

$T_{Y_L} = \begin{pmatrix} 1 & 0 \\ Y_L & 1 \end{pmatrix} \qquad T_\alpha = T_t \cdot T_{Y_L} \qquad A_\alpha = \dfrac{V_1}{V_2}\Big|_{I_2=0} = T^{-1}$

$$A_\alpha = \frac{Z_A + Z_B}{Z_B} \cdot 1 + \frac{Z_A Z_B + Z_B Z_C + Z_C Z_A}{Z_B} \cdot \overset{\nearrow 1}{Y_L}$$

$$A_\alpha = \frac{sL_2 + 1/sC_1 + \frac{\cancel{s}L_2}{\cancel{s}C_1} + \frac{1}{sC_1}(sL_1) + s^2 L_1 L_2}{\frac{1}{sC_1}}$$

$$A_\alpha = s^2 L_2 C_1 + 1 + sL_2 + sL_1 + s^3 C_1 L_1 L_2$$

$$A_\alpha = s^3 C_1 L_1 L_2 + s^2 L_2 C_1 + s(L_2 + L_1) + 1$$

Reemplazando valores

$$A_\alpha = s^3 + s^2 \cdot 2 + s(2) + 1$$

$$T = \frac{1}{A_\alpha} = \frac{1}{s^3 + 2s^2 + 2s + 1}$$