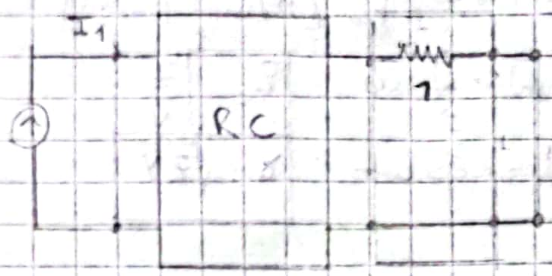
TS13

7)

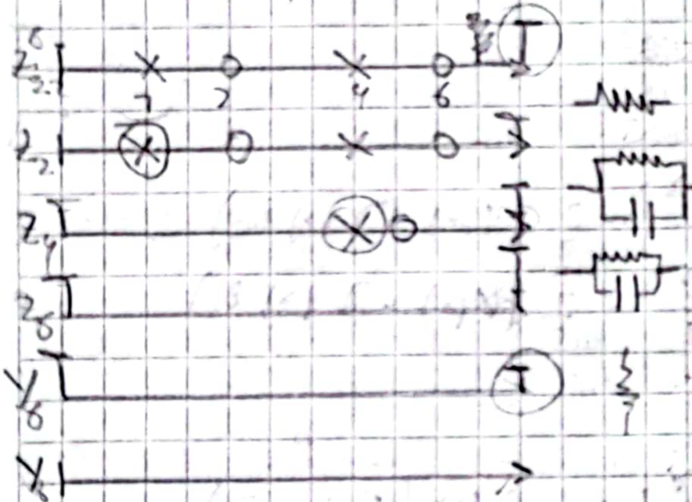


$$-\frac{I_2}{I_1} = H\,\frac{s^2+5s+4}{s^2+8s+12} \qquad Z_{21} = 6H$$

$$V_2 = Z_{21} I_1 + Z_{22} I_2 \to -\frac{I_2}{I_1} = \frac{Z_{21}}{Z_{22}} = \cancel{H}\,\frac{s^2+5s+4}{s^2+8s+12} = \frac{6\cancel{H}}{Z_{22}}$$

$$\to Z_{22} = 6\,\frac{s^2+8s+12}{s^2+5s+4} = \frac{6\,(s+2)(s+6)}{(s+1)(s+4)} \to Z_{RC} \text{ alternancia ✓}$$

Z_{RC} debe cumplir $Z_{RC}(0) > Z_{RC}(\infty)$. $Z_{RC}(0) = 18$ $\quad Z_{RC}(\infty) = 6$



Retiro parcialmente $R_L = 1$ para que la función lo contemple

$$Z_2 = Z_{22} - 1 = \frac{6(s^2+8s+12)}{s^2+5s+4} - 1$$

$$Z_2 = \frac{6s^2+48s+72 - s^2 - 5s - 4}{s^2+5s+4}$$

$$Z_2 = \frac{5s^2+43s+68}{s^2+5s+4}$$

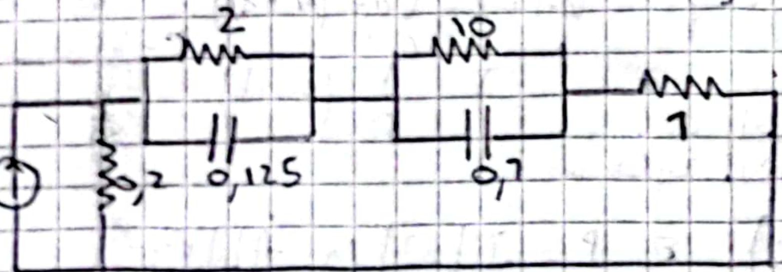
$$K_1 = \lim_{s \to -1} (s+1)\,\frac{5s^2+43s+68}{(s+4)\cancel{(s+1)}} = 10$$

$$Z_4 = \frac{5s^2+43s+68}{(s+4)(s+1)} - \frac{10}{(s+1)}\,\frac{(s+4)}{s+4} = \frac{5s^2+33s+28}{(s+1)(s+4)} = \frac{\cancel{(s+1)}\,(s+\frac{28}{5})\,5}{\cancel{(s+1)}\,(s+4)}$$

$$K_2 = \lim_{s \to -4} (s+4)\,\frac{(5s+28)}{s+4} = 8$$

$$Z_6 = \frac{5s+28}{s+4} - \frac{8}{s+4} = \frac{5\,\cancel{(s+4)}}{\cancel{s+4}} \qquad Y_{R6} = \frac{1}{5}$$

Retiro resistencia derivación $R = \frac{1}{5}$



TS13. 2)

$$\frac{V_2}{I_1} = \frac{s^2+9}{s^3+2s^2+2s+1}$$

$$V_2 = R_L \cdot (-I_2) \rightarrow I_2 = -\frac{V_2}{R_L}$$

Parámetros Z en Z: $V_2 = Z_{21} I_1 + Z_{22} I_2$

$$\rightarrow V_2 = Z_{21} I_1 - Z_{22}\frac{V_2}{R_L} \rightarrow V_2\left(1 + \frac{Z_{22}}{R_L}\right) = Z_{21} I_1$$

$$\rightarrow \frac{V_2}{I_1} = \frac{Z_{21}}{1 + \frac{Z_{22}}{R_L}} \quad R_L = 1 \qquad \left(Z = \frac{P/NQ}{1 + \frac{MQ}{NQ}} \right.$$

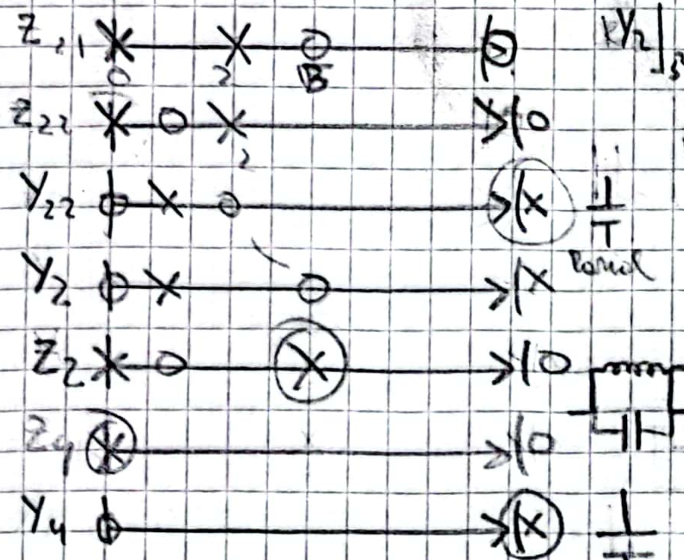
Siendo $Z = \frac{V_2}{I_1}\Big|_{I_2 = -\frac{V_2}{R_L}} = \frac{P}{Q} = \frac{P}{M_Q + N_Q}$ → Lo separo en par e impar

$$Z_{21} = \frac{s^2+9}{D} \qquad Z_{22}+1 = \frac{s^3+2s^2+2s+1}{D}$$

$$Q = s^3+2s^2+2s+1 = M+N \longrightarrow \begin{cases} M = 2s^2+1 \\ N = s^3+2s \end{cases}$$

Como P es par (s^2+9) elijo D impar $D = s^3+2s$

$$Z_{21} = \frac{s^2+9}{s^3+2s} \qquad Z_{22}+1 = \frac{s^3+2s^2+2s+1}{s^3+2s} \rightarrow Z_{22} = \frac{2s^2+1}{s^3+2s} = \frac{2(s^2+\frac{1}{2})}{s(s^2+2)}$$



$$Y_2\Big|_{s^2=-9} = 0 = Y_{22} - K_\infty s = 0 \rightarrow K_\infty = \frac{s(s^2+2)}{s(2s^2+1)} = \frac{7}{17}$$

$$Y_2 = \frac{s^3+2s}{2s^2+1} - \frac{7}{17}s = \frac{17s^3+34s-14s^3-7s}{17(2s^2+1)}$$

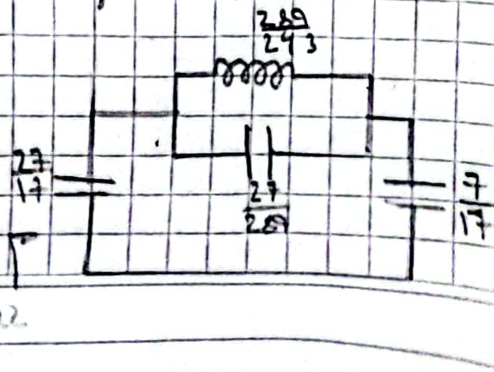
$$Y_2 = \frac{3s^3-27s}{17(2s^2+1)} = \frac{3(s^3-9s)}{17(2s^2+1)}$$

$$2k_1 = \lim_{s^2\to-9} \frac{\cancel{s^2+9}}{s} \cdot \frac{17(2s^2+1)}{3s\cancel{(s^2+9)}} = \frac{289}{27}$$

$$Z_4 = \frac{34s^2+17}{3s(s^2+9)} - \frac{289}{27}\cdot\frac{s}{s^2+9}\cdot\frac{3s}{3s}$$

$$Z_4 = \frac{918s^2+459-867s^2}{(s^2+9)\cdot 3\cdot s\cdot 27} = \frac{51\cancel{(s^2+9)}}{3\cdot 27\cdot s\cancel{(s^2+9)}} = \frac{17}{27s}$$

$Y_4 = \frac{27s}{17}$ → Elijo capacitor derivación $C = \frac{27}{17}$



Z_{22}

NOTA