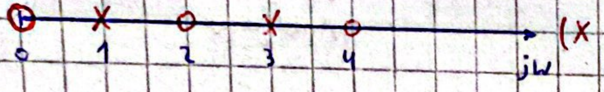
Trabajo Práctico N°6

2- Admitancia LC

$$Y(s) = \frac{s(s^2+2)(s^2+4)}{(s^2+1)(s^2+3)} = \frac{s^5+6s^3+8s}{s^4+4s^2+3}$$

$Y(s)$



a) Cauer 2 (remoción en ∞)

$$\begin{array}{l|l}
s^5+6s^3+8s & s^4+4s^2+3 \\
-(s^5+4s^3+3s) & \boxed{s} \\
\hline
s^4+4s^2+3 & 2s^3+5s \\
-(s^4+\tfrac{5}{2}s^2+0) & \boxed{\tfrac{1}{2}\cdot s} \\
\hline
2s^3+5s & \tfrac{3}{2}s^2+3 \\
-(2s^3+4s) & \boxed{\tfrac{4}{3}\cdot s} \\
\hline
\tfrac{3}{2}s^2+3 & 1s \\
-(\tfrac{3}{2}s^2+0) & \boxed{\tfrac{3}{2}\cdot s} \\
\hline
1s & 3 \\
-1s & \boxed{\tfrac{1}{3}\cdot s} \\
\hline
0 &
\end{array}$$

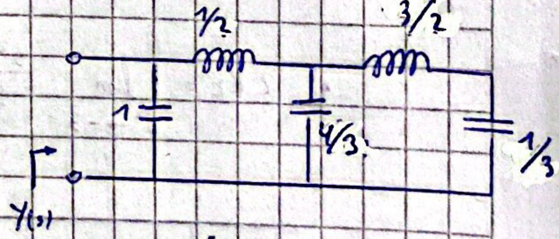
1

1/2

4/3

3/2

1/3



Normalizado

b) Cauer 1 (remoción en 0)

Para remover en 0 paso a $Z(s)$ $\Rightarrow$ $Z(s) = \dfrac{s^4+4s^2+3}{s^5+6s^3+8s}$

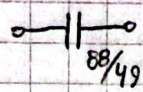
$$\begin{array}{l|l}
3+4s^2+s^4 & 8s+6s^3+s^5 \\
-(3+\tfrac{9}{4}s^2+\tfrac{3}{8}s^4) & \boxed{\tfrac{3}{8}\cdot\tfrac{1}{s}} \\
\hline
8s+6s^3+s^5 & \tfrac{7}{4}s^2+\tfrac{5}{8}s^4 \\
-(8s+\tfrac{20}{7}s^3+0) & \boxed{\tfrac{32}{7}\cdot\tfrac{1}{s}} \\
\hline
\end{array}$$

8/3

7/32

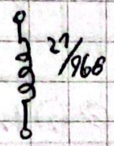
$$\frac{7}{4}s^2 + \frac{5}{8}s^4 \quad \Big| \; \frac{22}{7}s^3 + s^5$$

$$-\ \frac{7}{4}s^2 + \frac{49}{88}s^4 \qquad \boxed{\frac{49}{88}\cdot\frac{1}{s}}$$



$$\frac{22}{7}s^3 + s^5 \quad \Big| \; \frac{3}{44}s^4$$

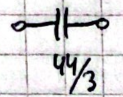
$$-\ \frac{22}{7}s^3 + 0 \qquad \boxed{\frac{968}{21}\cdot\frac{1}{s}}$$

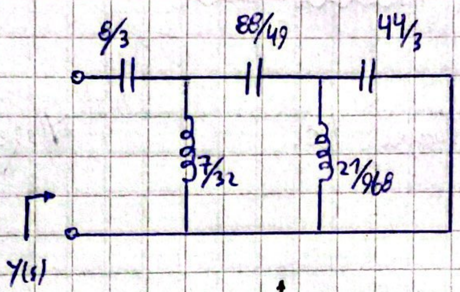


$$\frac{3}{44}s^4 \quad \Big| \; s^5$$

$$-\ \frac{3}{44}\cdot s^4 \qquad \boxed{\frac{3}{44}\cdot\frac{1}{s}}$$

$$0$$





normalizado

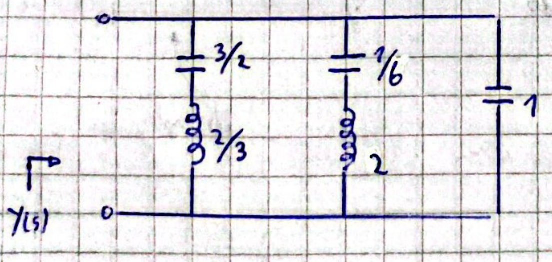
c) Foster en derivación

$$Y(s) = K_\infty \cdot s + \frac{2K_1 \cdot s}{s^2+1} + \frac{2K_2 \cdot s}{s^2+3}$$

- $K_\infty = \lim_{s\to\infty} \frac{1}{s}\, Y(s) = \lim_{s\to\infty} \frac{(s^2+2)(s^2+4)}{(s^2+1)(s^2+3)} = \boxed{1}$ $\rightarrow C = 1/K_\infty = 1$

- $2K_1 = \lim_{s^2\to -1} \frac{s^2+1}{s}\, Y(s) = \lim_{s^2\to -1} \frac{(s^2+4)(s^2+2)}{(s^2+3)} = \boxed{\frac{3}{2}}$ $\rightarrow L_1 = \frac{1}{2K_1} = 2/3$; $C_1 = \frac{2K_1}{w_1^2} = 3/2$

- $2K_2 = \lim_{s^2\to -3} \frac{s^2+3}{s}\, Y(s) = \lim_{s^2\to -3} \frac{(s^2+4)(s^2+2)}{(s^2+1)} = \boxed{1/2}$ $\rightarrow L_2 = 1/2K_2 = 2$; $C_2 = \frac{2K_2}{w_2^2} = 1/6$



$\rightarrow$ Normalizado

d) Foster serie

$$Z(s) = \frac{(s^2+1)(s^2+3)}{s\,(s^2+2)(s^2+4)} \Rightarrow Z(s) = \frac{K_0}{s} + \frac{2K_1 \cdot s}{s^2+2} + \frac{2K_2 \cdot s}{s^2+4}$$

- $K_0 = \lim_{s\to 0} s \cdot Z(s) = \lim_{s\to 0} \frac{(s^2+1)(s^2+3)}{(s^2+2)(s^2+4)} = \boxed{\frac{3}{8}}$ $\rightarrow C_0 = 1/K_0 = 8/3$

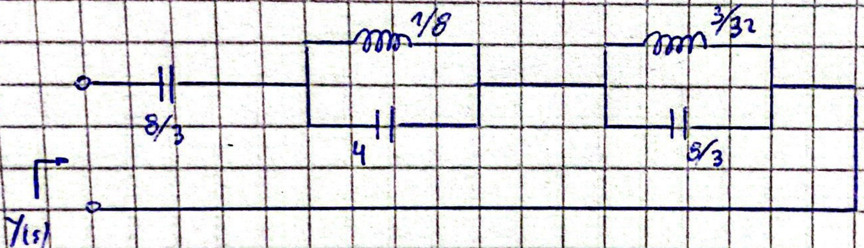
FECHA

• $2K_1 = \lim\limits_{s^2 \to -2} \frac{s^2+2}{s} Z(s) = \lim\limits_{s^2 \to -2} \frac{(s^2+1)(s^2+3)}{s^2(s^2+4)} = \boxed{1/4}$ → $C_1 = 1/2K_1 = 4$

$L_1 = \frac{2K_1}{w_1^2} = 1/8$

• $2K_2 = \lim\limits_{s^2 \to -4} \frac{s^2+4}{s} Z(s) = \lim\limits_{s^2 \to -4} \frac{(s^2+1)(s^2+3)}{s^2(s^2+2)} = \boxed{3/8}$ → $C_2 = \frac{1}{2K_2} = 8/3$

$L_2 = \frac{2K_2}{w_2^2} = 3/32$



→ Normalizado

Para desnormalizar componentes:

$$\begin{cases} L = L_N \cdot \frac{\Omega_Z}{\Omega_W} \\ C = C_N \cdot \frac{1}{\Omega_Z \cdot \Omega_W} \\ R = R_N \cdot \Omega_Z \end{cases}$$