TS10

① $Z(s) = \dfrac{(s^2+3)(s^2+1)}{s(s^2+2)}$

a) Sintesis de $Z(s)$ mediante Foster paralelo.

$$Z(s) = \frac{s^4+s^2+3s^2+3}{s^3+2s} = \frac{s^4+4s^2+3}{s^3+2s}$$

$$k_0 = \lim_{s\to 0} s\,Z(s) = \lim_{s\to 0} \frac{\cancel{s}\,(s^2+3)(s^2+1)}{\cancel{s}\,(s^2+2)} = \frac{3}{2}$$

$$k_1 = \lim_{s^2\to -2} \frac{(s^2+2)}{2s} Z(s) = \lim_{s^2\to -2} \frac{\cancel{s^2+2}}{2s} \cdot \frac{(s^2+3)(s^2+1)}{s\,\cancel{(s^2+2)}} = \frac{1\cdot(-1)}{2\cdot(-2)} = \frac{1}{4}$$

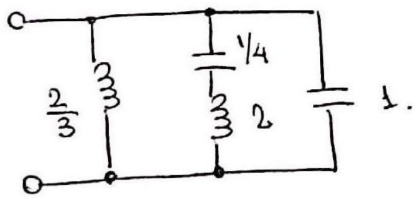
$$k_\infty = \lim_{s\to\infty} \frac{Z(s)}{s} = \lim_{s\to\infty} \frac{(s^2+3)(s^2+1)}{s^2(s^2+2)} = 1.$$

$$\Rightarrow Z(s) = \frac{3/2}{s} + \frac{1/2\, s}{s^2+4} + s$$

$$\frac{2k_1}{\omega_1^2} = \frac{2\cdot 1/4}{2} = \frac{1}{4}$$

$$\frac{1}{2k_1} = 2$$

El circuito queda:

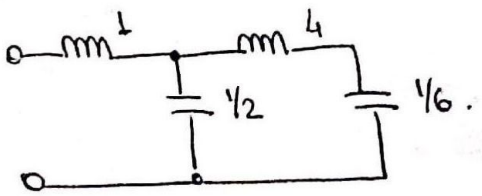


Mediante CAUER I

$$Z(s) = \frac{s^4+4s^2+3}{s^3+2s}$$

$$\begin{array}{l}
\; s^4+4s^2+3 \;\;\big|\; s^3+2s \\
-\; s^4+2s^2 \qquad\quad\;\; s \\
\hline
\; s^3+2s \;\;\big|\; 2s^2+3 \\
-\; s^3+\tfrac{3}{2}s \qquad \tfrac{1}{2}s \\
\hline
\; 2s^2+3 \;\;\big|\; \tfrac{1}{2}s \\
-\; 2s^2 \qquad\quad 4s \\
\hline
\; \tfrac{1}{2}s \;\;\big|\; 3 \\
-\; \tfrac{1}{2}s \qquad \tfrac{1}{6}s \\
\hline
\; 0
\end{array}$$

El circuito queda:



Scanned with CamScanner

Mediante CAUER II

$$\begin{array}{l|l} 3+4s^2+s^4 & 2s+s^3 \\ -\left(3+\frac{3}{2}s^2\right) & \frac{3}{2}\cdot\frac{1}{s} \\ \hline \end{array}$$

$$\begin{array}{l|l} 2s+s^3 & \frac{5}{2}s^2+s^4 \\ -\left(2s+\frac{4}{5}s^3\right) & \frac{4}{5}\cdot\frac{1}{s} \\ \hline \end{array}$$

$$\begin{array}{l|l} \frac{5}{2}s^2+s^4 & \frac{1}{5}s^3 \\ \frac{5}{2}s^2+ & \frac{25}{2}\frac{1}{s} \\ \hline \end{array}$$

$$\begin{array}{l|l} \frac{1}{5}s^3 & s^4 \\ -\frac{1}{5}s^3 & \frac{1}{5}\frac{1}{s} \\ \hline 0 & \end{array}$$