Tarea Semanal Nº 9

1)

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

2)

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

$gr\{NUM\} = 3$

$gr\{DEN\} = 4$

$(s^2+3) \to$ TANQUE 1

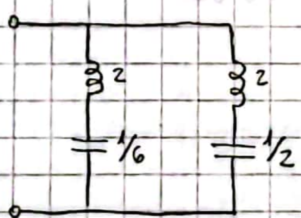
$(s^2+1) \to$ TANQUE 2

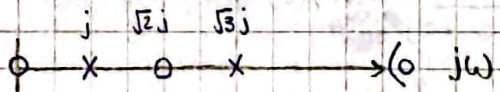
$$\lim_{s^2 \to -3} \frac{(s^2+3)}{s} Y(s) = \frac{(-3+2)}{(-3+1)} = \frac{1}{2}$$

$$\lim_{s^2 \to -1} \frac{(s^2+1)}{s} Y(s) = \frac{(-1+2)}{(-1+3)} = \frac{1}{2}$$

$$Y(s) = \frac{s(s^2+2)}{(s^2+3)(s^2+1)} = \frac{\frac{1}{2}s}{s^2+3} + \frac{\frac{1}{2}s}{s^2+1} = \frac{1}{s\,2 + \frac{1}{s\,1/6}} + \frac{1}{s2 + \frac{1}{s\,1/2}}$$

Circuito

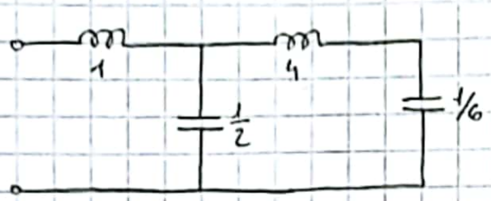




b) CAUER 1

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

$$
\begin{array}{l}
s^4+4s^2+3 \;\big|\; s^3+2s \\
s^4+2s^2+0 \quad\; s \longrightarrow Z_1 \\
s^3+2s \;\big|\; 2s^2+3 \\
s^3+\tfrac{3}{2}s \quad\; s/2 \longrightarrow Y_1 \\
2s^2+3 \;\big|\; \tfrac{1}{2}s \\
2s^2+0 \quad\; 4s \longrightarrow Z_3 \\
\tfrac{1}{2}s \;\big|\; 3 \\
0 \quad\; s/6 \longrightarrow Y_3
\end{array}
$$



CAUER 2

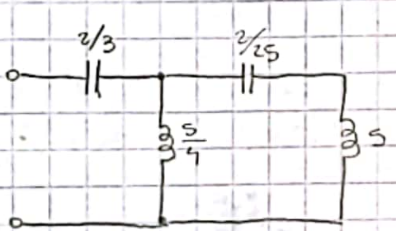
$$\begin{array}{l|l} 3+4s^2+s^4 & 2s+s^3 \\ -\;3+\tfrac{3}{2}s^2+0 & \boxed{\tfrac{3}{2s}} \longrightarrow Z \end{array}$$

$$\begin{array}{l|l} 2s+s^3 & \tfrac{5}{2}s^2+s^4 \\ -\;2s+\tfrac{4}{5}s^3 & \boxed{\tfrac{4}{5s}} \longrightarrow Y \end{array}$$

$$\begin{array}{l|l} \tfrac{5}{2}s^2+s^4 & \tfrac{s^3}{5} \\ -\;\tfrac{5}{2}s^2+0 & \boxed{\tfrac{25}{2s}} \longrightarrow Z \end{array}$$

$$\begin{array}{l|l} s^3/5 & s^4 \\ 0/ & \boxed{\tfrac{1}{5s}} \longrightarrow Y \end{array}$$

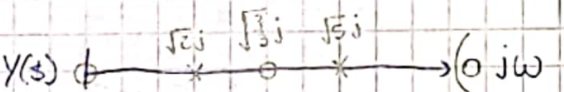
CIRCUITO

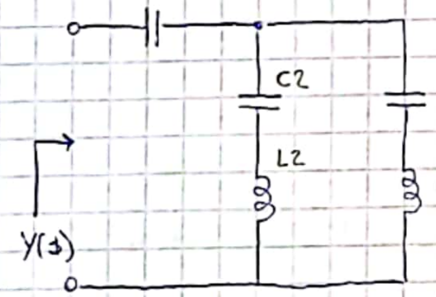


②

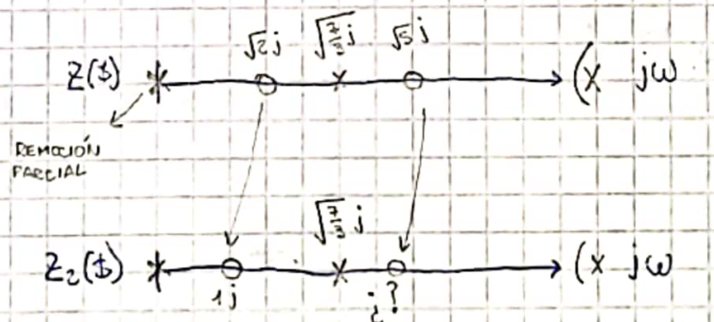
$$Y(s) = \frac{3s\left(s^2+7/3\right)}{\left(s^2+2\right)\left(s^2+5\right)}$$

1,53 — 1,41 — 2,236

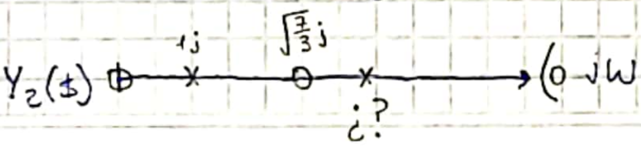




$$Z(s) = \frac{\left(s^2+2\right)\left(s^2+5\right)}{3s\left(s^2+7/3\right)}$$



$$Y(s) = \frac{1}{Z_2(s)}$$



NOTA

$$Z(s) - \frac{K_0}{s} = Z_2(s) \quad \Longrightarrow \quad Z_2(s)\Big|_{s=j1} = 0$$

$$Z(s)\cdot s\Big|_{s=j1} = K_0$$

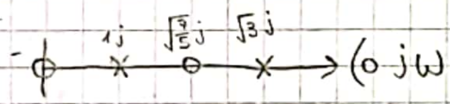
$$K_0 = \frac{(-1+2)(-1+5)\cancel{s}}{\cancel{s}\cdot 3(-1+7/3)} = 1$$

$$Z_2(s) = Z(s) - \frac{1}{s} = \frac{(s^2+2)(s^2+5)}{3s(s^2+7/3)} - \frac{1}{s} = \frac{(s^2+2)(s^2+5) - 3(s^2+7/3)}{3s(s^2+7/3)}$$

$$Z_2(s) = \frac{s^4+7s^2+10-3s^2-7}{3s(s^2+7/5)} = \frac{s^4+4s^2+3}{3s(s^2+7/5)} = \frac{(s^2+1)(s^2+3)}{3s(s^2+7/5)}$$

$$S = s^2 \Rightarrow S^2 + 4S + 3 \quad \begin{cases} S_1 = -1 \longrightarrow s_1 = 1j \\ S_2 = -3 \longrightarrow s_2 = 3j \end{cases}$$

$$Y_2(s) = \frac{1}{Z_2(s)} = \frac{3s(s^2+7/3)}{(s^2+1)(s^2+3)}$$



$$\lim_{s^2\to -1} Y_2(s)\cdot\frac{(s^2+1)}{s} = \frac{3(-1+7/3)}{(-1+3)} = 2 = 2k_1 \Longrightarrow \frac{2s}{s^2+1} = \frac{1}{s\frac{1}{2}+\frac{1}{s2}}$$

$$\lim_{s^2\to -3} Y_2(s)\cdot\frac{(s^2+3)}{s} = \frac{3(-3+7/3)}{(-3+1)} = 1 = 2k_2 \Longrightarrow \frac{s}{s^2+3} = \frac{1}{s+\frac{1}{s\,1/3}}$$