Isidoro Eduardo Pérez

Sust. 4 en 5

(ec.6) $I_1 = V_o C_2 S C_1 S \left(\frac{1}{C_1 S} + R_c + \frac{1}{C_2 S} \right)$

Sust 6 en 1

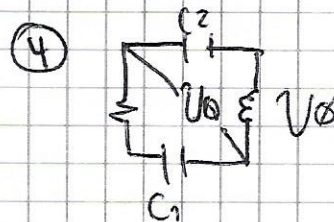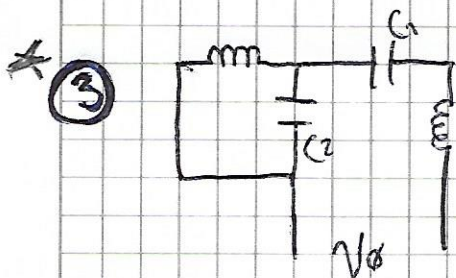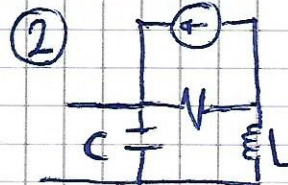$V_c = R_1 \left(V C_2 S C_1 S \left[\frac{1}{C_1 S} + R_2 + \frac{1}{C_2 S} \right] \right) + \frac{1}{C_1 S} \left(V_o C_2 S C_1 S \left(\frac{1}{C_1 S} + R_2 + \frac{1}{C_2 S} \right) - V_o C_2 \right)$

$$\frac{V_s}{V_o} = \frac{1}{(R_1 C_1 C_2 S^2 \left[\frac{1}{C_1 S} + R_2 + \frac{1}{C_2 S} \right]) + (C_2 S (\frac{1}{C_1 S} + R_2 + \frac{1}{C_2 S})) - \frac{C_2}{C_1}}$$
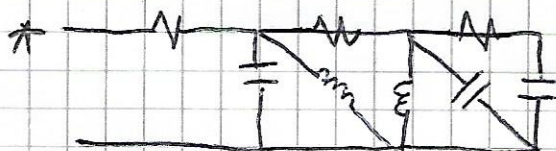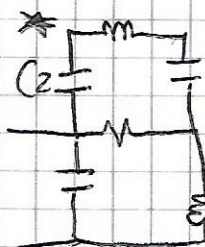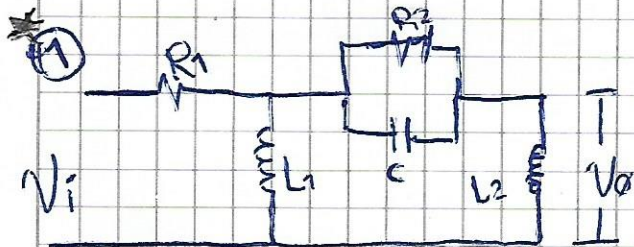
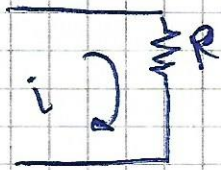Isidoro Eduard Pérez S.   10/01/2020

Modelado de sistemas

-Electrónicos   Sist. de 1er Orden
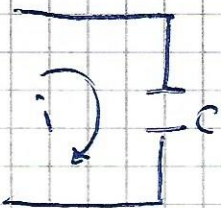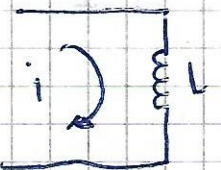
$V = iR \rightarrow V = R \cdot I$

$V = \frac{1}{C} \int i \, dt$

$V = L \frac{di}{dt}$
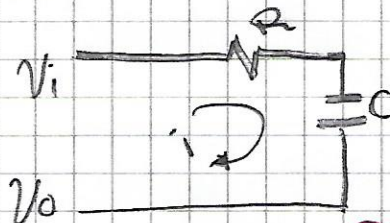
① $V_i = i \cdot R + \frac{1}{C} \int i \, dt \rightarrow V_c = I \cdot R + \frac{1}{Cs} I$

$V_s = \frac{1}{C} \int i \, dt \rightarrow V_s = \frac{1}{Cs} \cdot I$

③ $G(s)$

$$\frac{V_s = \frac{1}{Cs} I}{IR + \frac{1}{Cs} I} = \frac{\frac{1}{Cs} I}{I(R + \frac{1}{s})} = \frac{\frac{1}{Cs}}{R + \frac{1}{Cs}}$$

$$\frac{\frac{1}{Cs}}{\frac{CsR + 1}{Cs}} = \frac{1}{RCs + 1} = G(s)$$

Mallas LMK

$\emptyset = V_{R_1} + V_{C_1} - V_R$

$V_R = V_R + V_{C_1}$
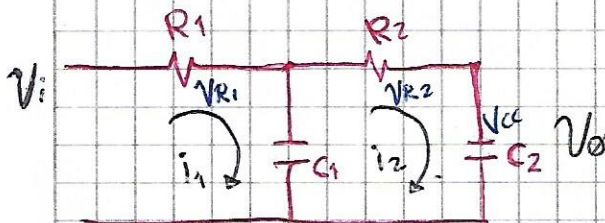
$\emptyset = V_{C_1} + V_{R_2} + V_{C_2}$

$\emptyset = \frac{1}{C_1} \int i \, dt$

① $V_c = R_1 I_1 + \frac{1}{C_1 s}(I_1 - I_2)$

② $\emptyset = \frac{1}{C_1 s}(I_2 - I_1) + R_2 I_2 + \frac{1}{C_2 s} I_2$

③ $V_s = \frac{1}{C_2 s} I_2$ ④ $I_2 = V_s C_2 s$

Para la 2

$\emptyset = -\frac{1}{C_1 s} I_1 + I_2 \left(\frac{1}{C_1 s} + R_2 + \frac{1}{C_2 s} \right)$

$\frac{1}{C_1 s} I_1 = I_2 \left(\frac{1}{C_1 s} + R_2 + \frac{1}{C_2 s} \right)$

⑤ $I_1 = I_2 C_1 s \left(\frac{1}{C_1 s} + R_2 + \frac{1}{C_2 s} \right)$

Strike-isi.

$V_i = V_{C2} + V_{C1} + V_{L2}$
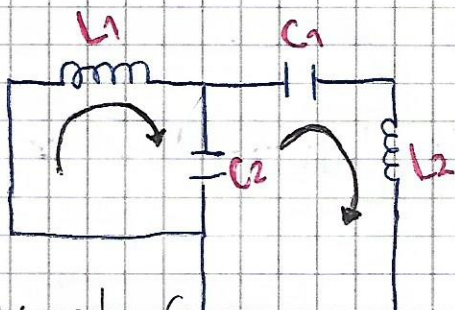
$V_i = \frac{1}{C_2} \int (i_1 - i_2) dt + \frac{1}{C_1} \int i_1 dt + L_2 \frac{di_2}{dt}$

$0 = V_{L1} + V_{C2}$

$0 = L_1 \frac{di_2}{dt} + \frac{1}{C_2} \int (i_2 - i_1) dt$

$V_s = \frac{1}{C_1} \int i_1 dt$

1) $V_i = \frac{1}{C_2 S} (I_1 - I_2) + \frac{1}{C_1 S} I_1 + L_2 S I_1$

2) $0 = L_1 S I_2 + \frac{1}{C_2 S} (I_2 - I_1)$

3) $V_s = \frac{1}{C_1 S} I_1$

4) $I_1 = V_s C_1 S$

$0 = -\frac{1}{C_2 S} (I_1 - I_2)(\frac{1}{C_2 S} + L_1 S)$

$-I_2 (\frac{1}{C_2 S} + L_1 S) = \frac{1}{C_2 S} I_1 = I_2 = \frac{1}{C_2 S} I_1 (\frac{1}{C_2 S} + L_1 S)$

Sustituir 4 en 5

5) $I_2 = \frac{1}{C_2 S} V_s C_1 S (\frac{1}{C_2 S} + L_1 S)$

6 en 1

$V_i = \frac{1}{C_2 S} (\frac{1}{C_2 S} V_s C_1 S [\frac{1}{C_2 S} + L_1 S] - V_s C_1 S) + \frac{1}{C_1 S}(V_s C_1 S) + L_2 S (V_s C_1 S)$

$V_i = V_s (\frac{1}{C_2 S} [\frac{1}{C_2 S} C_1 S \{\frac{1}{C_2 S} + L_1 S\} - C_1 S] L_2 S (C_1 S)$
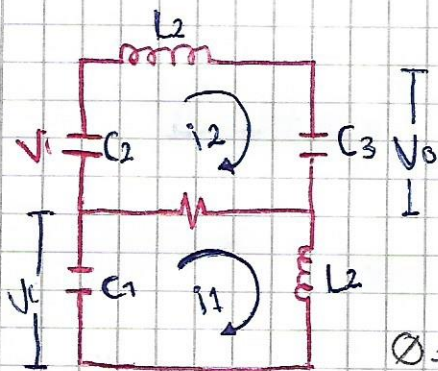
función de transferencia

$\frac{V_s}{V_i} \qquad \dfrac{1}{\frac{1}{C_2 S} [\frac{1}{C_2 S} C_1 S (\frac{1}{C_2 S} + L_1 S) - C_1 S] + L_2 S (C_1 S))}$

$\frac{V_s}{V_i} = \dfrac{C_2 S C_2 S C_1 S [\frac{1}{C_2 S} + L_1 S] - C_1 S) + L_2 S (C_2 S)}{C_2 S C_1 S}$

$\frac{V_s}{V_i} \qquad \dfrac{C_2 S C_1 S}{C_2 S + C_1 S + L_1 S + C_2 S + L_2 S}$

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$$\emptyset = V_{C1} + V_R + V_{L2} - V_C$$

$$V_i = V_{C1} + V_R + V_{L2}$$

$$V_i = \tfrac{1}{C_1}\int i_1\,dt + R(i_1 - i_2)\, L\,\frac{di}{dt}$$

$$\emptyset = V_{C2} + V_{C1} + V_{C3} + V_R$$

$$\emptyset = \tfrac{1}{C_2}\int i_2\,dt + L\,\frac{di_2}{dt} + \tfrac{1}{C_3}\int i_2\,dt + R(i_2 - i_1)$$

$$V_S = \tfrac{1}{C_3}\int i_2\,dt$$

1) $V_i = \tfrac{1}{C_1 S}I_1 + R(I_1 - I_2) + L_2 S\,I_1$

2) $\emptyset = \tfrac{1}{C_2 S}I_2 + L_1 S\,I_2 + \tfrac{1}{C_3 S}I_2 + R(I_2 - I_1)$

3) $V_S = \tfrac{1}{C_3 S}I_2$

4) $I_2 = V_S\,C_3\,S$

$\emptyset = -R\,I_1 + I_2\left(\tfrac{1}{C_2 S} + L_1 S + \tfrac{1}{C_3 S} + R\right)$

5) $I_1 = I_2\,R\left(\tfrac{1}{C_2 S} + L_1 S + \tfrac{1}{C_3 S} + R\right)$

4 en 5

6) $I_1 = V_S\,C_3\,S\,R\left(\tfrac{1}{C_2 S} + L_1 S + \tfrac{1}{C_3 S} + R\right)$

6 en 1

$$V_i = \tfrac{1}{C_1 S}\left(V_S C_3 S R\left[\tfrac{1}{C_2 S} + L_1 S + \tfrac{1}{C_3 S} + R\right]\right) + R\left(V_S C_3 S R\left[\tfrac{1}{C_2 S} + L_1 S\right.\right.$$

$$\left.\left. + \tfrac{1}{C_3 S} + R\right] - V_S(C_3 S)\right) + L_2 S\left(V_S C_3 S R\left(\tfrac{1}{C_2 S} + L_1 S + \tfrac{1}{C_3 S} + R\right)\right)$$

Función de transferencia
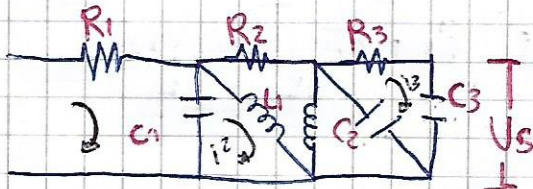
$$\frac{V_S}{V_i} = \cfrac{1}{(C_3 S R[\tfrac{1}{C_2 S} + L_1 S + \tfrac{1}{C_3 S} + R) + (C_3 S(\tfrac{1}{C_2 S} + L_1 S + \tfrac{1}{C_3 S} + R)C_3 S) + C_2 S(C_3 S R[\tfrac{1}{C_2 S} + L_1 S + \tfrac{1}{C_3 S} + R)}$$

Agrupando términos semejantes

$$\frac{V_S}{V_i} = \cfrac{1}{C_3 S R\, C_2 S + L_1 + C_3 S\, C_2 S + L_1 S + R + L_2 S + C_3 S R + L_1 S}$$

$\emptyset = V_{R_1} + V_{C_1}$

$\emptyset = V_{C_1} + V_{R_2} + V_{L_1} + V_{L_2} + V_{C_2} + V_{R_3} + V_{L_3}$

$V_S = \frac{1}{C_3} \int i_3 \, dt$

$\emptyset = \frac{1}{C_1}(i_2 - i_1)dt + i_2 R_2 + L_1 \frac{di_2}{dt} + L_2 \frac{d(i_2 + i_3)}{dt} \frac{1}{C_2}(i_3 - i_2) + i_3 R_3 + \frac{1}{C_3} i_3$

$V_i = I_1 R_1 + \frac{1}{C_1} \int (i_1 - i_2) dt$

$V_{R_1} = I_1 R_1$ $V_{R_3} = i_3 R_3$

$V_{C_1} = \frac{1}{C_1} \int (i_1 - i_2) dt$ $V_{C_2} = \frac{1}{C_2} \int i_3 \, dt$

$V_{R_2} = I_2 R_2$

$L_1 = L_1 \frac{di_2}{dt}$ $V_3 = \frac{1}{C_3} \int i_3 \, dt$

$L_2 = L_2 \frac{d(i_2 - i_3)}{dt}$

① $V_i = I_1 R_1 + \frac{1}{C_1 S}(I_1 + I_2) dt$

② $\emptyset = \frac{1}{C_1 S}(I_2 - I_3) + I_2 R_2 + L_1 S I_2 + L_2 S (I_2 - I_3) + \frac{1}{C_2 S} I_3 + I_3 R_3 +$

$\frac{1}{C_3 S}$ ③ $V_S = \frac{1}{C_3 S} I_3$ ④ $I_3 = V_S C_3 S$

$\emptyset = -\frac{1}{C_1 S} I_1 + I_2 (R_2 + L_1 S + L_2 S - I_3 + \frac{1}{C_2 S} I_3 + I_3 R_3 + \frac{1}{L_3 S} I_3)$

⑤ $I_1 = I_2 C_1 S (R_2 + L_1 S + L_2 S - I_3 + \frac{1}{C_2 S} I_3 R_3 + \frac{1}{C_3 S} I_2)$

Sustituir 4 en 5

$6 I_1 = I_2 C_1 S (R_2 + L_1 S + L_2 S - (V_S C_3 S) + \frac{1}{C_2 S}(V_S C_3 S) + (V_S C_3 S) R_3 + \frac{1}{C_3 S})$

$= [I_2 C_1 S (R_2 + L_1 S + L_2 S - (V_S C_3 S) + \frac{1}{C_2 S}(V_S C_3 S) + (V_S C_3 S) R_3 + \frac{1}{C_3 S}(V_S C_3 S))] R_1 + \frac{1}{C_2 S}$

Landero Edward Pérez A.

14/01/20

$$V_i = V_S \left[I_2 C_1 S \left(R_2 + L_1 S + L_2 S + \frac{1}{C_2 S} + R_3 + \frac{1}{C_3 S} \right] R_1 + \frac{1}{C_1 S} \left[I_2 C_3 \left(R_2 + L_1 S + L_2 S + \frac{1}{C_2 S} \right. \right.$$

$$\left. + R_3 + \frac{1}{C_2 S} \right]$$

$$\frac{V_S}{V_i} = \frac{1}{\left[I_2 C_1 S \left(R_2 + C_1 S + L_2 S + \frac{1}{C_2 S} + R_3 + \frac{1}{C_3 S} \right] R_1 + \frac{1}{C_1 S} \left[I_2 C_1 S \left(R_2 + L_1 S + L_2 S + \frac{1}{C_2 S} R_3 \right. \right.}$$

$$+ \frac{1}{C_3 S} \right]$$

$$\frac{V_S}{V_i} = \frac{1}{\left[\frac{I_2 C S^3 \left(R_2 + L + L_2 + 1 + R_3 + 1 \right)}{C_2 C_3 S} \right] R_1 + \frac{1}{C_1 S} \left[I_2 C_1 S \left(R_2 L_1 S^2 + L_2 + R_3 + 1 \right) \right]}$$

$$\frac{V_S}{V_i} = \frac{C_2 S C_3 S}{I_2 L S^3 \left(R_2 + L + L_2 + 1 + R_3 + 1 \right) R_1 \left(I_2 L_1 S \left(R_2 + L_1 S^2 + L_2 + \left(R_3 + L \right) \right) \right.}$$