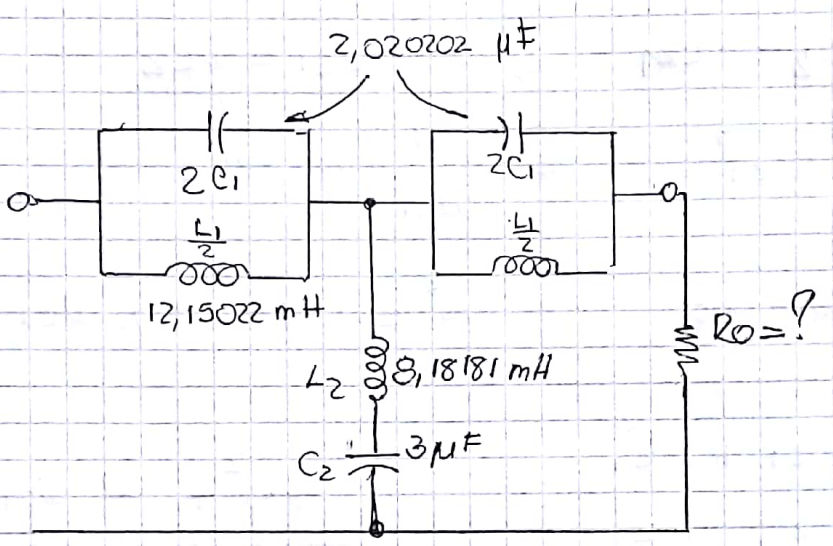
2020
Final de Mica

FILTROS
ELIMINA BANDA



b) Pulsación de Resonancia (ω_o)

$$\omega_o = \frac{1}{\sqrt{L_1 \cdot C_1}} = \frac{1}{\sqrt{L_2 \cdot C_2}} = \frac{1}{\sqrt{12,15022 \times 10^{-3} \times 2,020202 \times 10^{-6}}}$$

$\omega_o = 6382,789$ o $6382,850$ [rad/seg]

$$\omega_o = \frac{1}{\sqrt{L_2 C_2}} = \frac{1}{\sqrt{8,18181 \times 10^{-3} \times 3 \times 10^{-6}}} = 6382,850$$

Resultado Correcto

(Elijo tomar los Componentes con menos decimales)

c) Frecuencia de resonancia (f_o)

$$\omega_o = 2\pi f_o \quad \therefore \quad f_o = \frac{\omega_o}{2\pi} = \frac{6382,850}{2\pi} = 1015,862$$

D) Ancho de Banda: [BW] = ~~3668,089~~ 5500 ✓

$$BW = \frac{1}{2\sqrt{L_2 (C_1)}} = \frac{1}{2 \cdot \sqrt{8,18181 \times 10^{-3} \cdot \frac{2,020202 \times 10^{-6}}{2}}} = 550,002$$

~~3668,089~~

$C_1/2$

E) Pulsación de corte inferior (ω_{c1})

$AB = W = \omega_{c2} - \omega_{c1} \Rightarrow \omega + \omega_{c1} = \omega_{c2}$

$\omega_o = \sqrt{\omega_{c2} \cdot \omega_{c1}} \Rightarrow \frac{\omega_o^2}{\omega_{c1}} = \omega_{c2}$

$\therefore \frac{\omega_o^2}{\omega_{c1}} = \omega + \omega_{c1} \Rightarrow \omega_o^2 = (\omega + \omega_{c1}) \cdot \omega_{c1}$

$\omega_o^2 = \omega \cdot \omega_{c1} + \omega_{c1}^2$

$\boxed{\omega_{c1}^2 + \omega \cdot \omega_{c1} - \omega_o^2 = 0}$

$\omega \cdot \omega_{c1} + \omega_{c1}^2 - \omega_o^2 = 0$

$\omega_{c1}^2 + 5500{,}002 \cdot \omega_{c1} - (6382{,}850)^2 = 0$

$\boxed{\omega_{c1} = 4200{,}055 \ [rad/seg]}$ ✓

F) Pulsación de corte superior (ω_{c2})

$\boxed{\omega_{c2} = \omega + \omega_{c1}} = 5500{,}002 + 4200{,}055$

$\omega_{c2} = 9700{,}057 \ [rad/seg]$ 9700,058 ✓

G) Valor de la impedancia característica (Z_o)

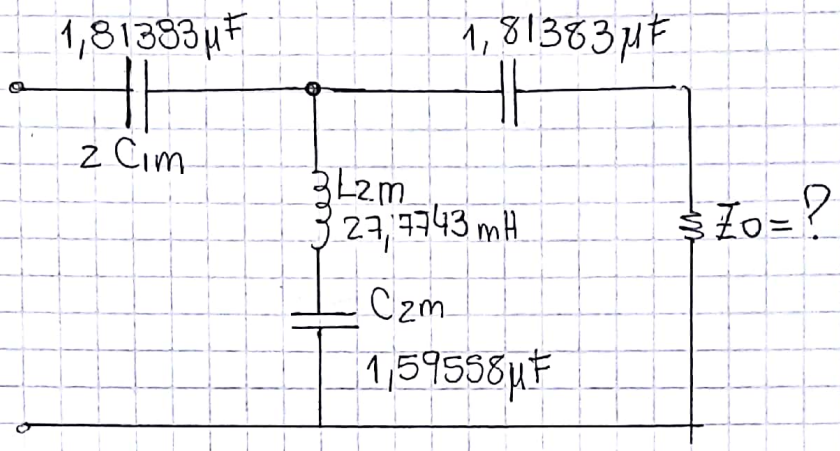
$W = \frac{1}{2 \cdot R_o \cdot C_1} \Rightarrow R_o = \frac{1}{2W \cdot C_1} = \frac{1}{2 \cdot 5500{,}002 \cdot \frac{2{,}020202 \cdot 10^{-6}}{2}}$

$R_o = 89{,}999 \ [\Omega]$ · 90 Ω ✓

2020

Filtro m-Derivado.

2)



A) Tipo de Filtro: PASA ALTOS m-Derivados

B) Pulsación de Corte (w_c)

$$w_c = \frac{1}{2.m.\sqrt{L_{2m}.C_{1m}}} \qquad m = \sqrt{\frac{C_{2m}}{(C_{2m}+4C_{1m})}}$$

$$m = \sqrt{\frac{1,59558\times10^{-6}}{1,59558\times10^{-6}+4\,\frac{1,81383\times10^{-6}}{2}}} = 0,552699 \simeq 0,5527$$

$$w_c = \frac{1}{2\times0,552699\sqrt{27,774\times10^{-3}\cdot\frac{1,81383\times10^{-6}}{2}}} = 5700,05199$$

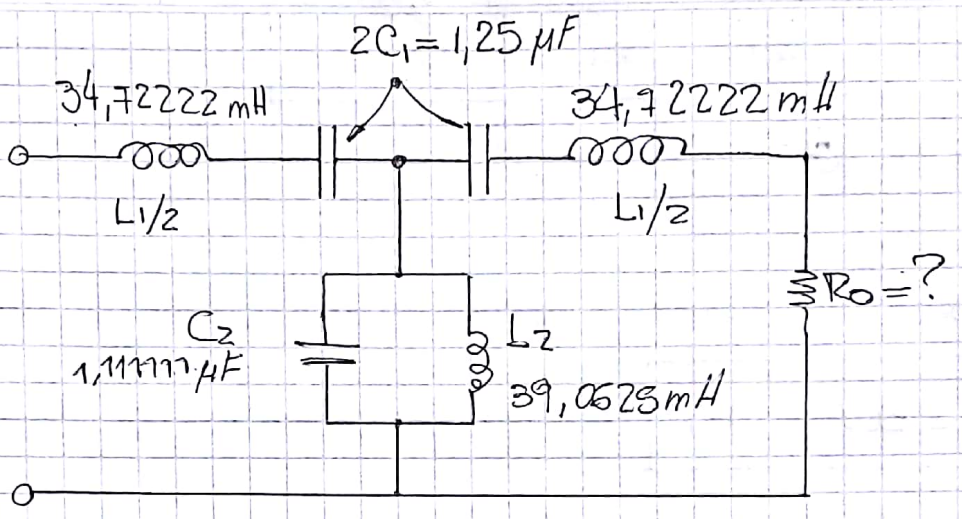
$$f_c = \frac{w_c}{2\pi} = 907,19$$

$$Z_o = \sqrt{\frac{L_{2m}}{C_{1m}}} = \sqrt{\frac{27,7743\times10^{-3}}{\frac{1,81383\times10^{-6}}{2}}} = 175,0000886$$

$$\omega_{oo} = \frac{1}{\sqrt{C_{2m} L_{2m}}} = \frac{1}{\sqrt{1,59558 \times 10^{-6} \cdot 27,7743 \times 10^{-3}}}$$

$$\omega_{oo} = 4750,2793 \quad [rad/seg]$$

Final 2020 — Filtro Pasa Banda.



A) Tipo de Filtro: PASA_BANDA.

B) Pulsación de corte ó de resonancia (w_c o w_o)

$$w_o = \frac{1}{\sqrt{L_2 . C_2}} = \frac{1}{\sqrt{39{,}0625 \times 10^{-3} \cdot 1{,}111111 \times 10^{-6}}} = 4800{,}0024$$

$$w_o = \frac{1}{\sqrt{L_1 . C_1}} = \frac{1}{\sqrt{2 \cdot 34{,}72222 \cdot 10^{-3} \cdot \frac{1{,}25 \times 10^{-6}}{2}}} = 4800{,}000154 \checkmark$$

C) Frecuencia de corte o de resonancia

$f_o = 763{,}943$ [Hz]

D) Ancho de Banda [BW]

$$BW = \frac{2}{\sqrt{L_1 . C_2}} = \frac{2}{\sqrt{2 \cdot 34{,}72222 \times 10^{-3} \cdot 1{,}111111 \times 10^{-6}}}$$

$BW = 7200{,}00059$ ✓ [rad/seg]

E) Pulsación de corte inferior (ω_{c1}) 2400,000074 rad/seg

$$\omega_{c1}^2 + BW \cdot \omega_{c1} - \omega_0^2 = 0$$

$$\omega_{c1} = 2400,000005$$

F) Pulsación de corte superior ω_{c2}:

$$\omega_{c2} = BW + \omega_{c1} = 7200,00059 + 2400,000005$$

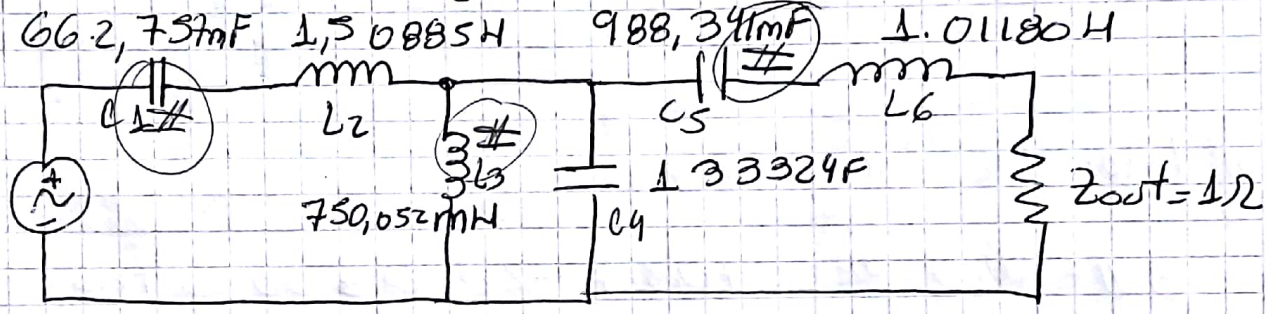
$$\omega_{c2} = 9600,000595$$

G) Valor de la impedancia característica (Z_0)

$$Z_0 = \sqrt{\frac{L_2}{C_1}} = \sqrt{\frac{39,0625 \times 10^{-3}}{\frac{1,25 \times 10^{-6}}{2}}} = 250\ \Omega$$

$$Z_0 = \frac{2}{C_2 \cdot BW} = \frac{2}{1,1111111 \times 10^{-6} \cdot 7200,00059} = 250,000045$$ ✓

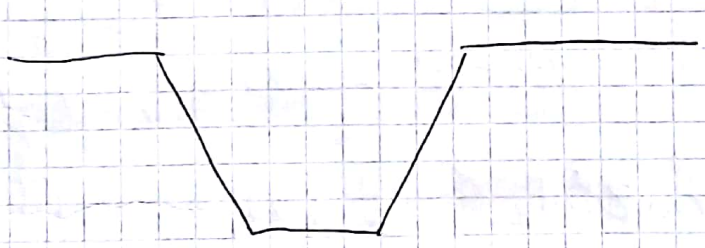
Dado el siguiente filtro Pasa Banda (PB) normalizado de chevishev, calcule los valores de los componentes, para una frecuencia de corte inferior $f_{c1} = 318,30988$ (Hertz), una frecuencia de corte superior $f_{c2} = 1114,0846$ (Hertz) y una impedancia de carga $R_0 = 600\,\Omega$.



A) Valor de la pulsación natural o de resonancia

$\omega_0 =$

Filtro Pasa Banda:



B) $\omega_{C1} = 2\pi \cdot 318,30988 = 1999,999 = 2000$ [rad/seg]

F) $\omega_{C2} = 2\pi \cdot 1114,0846 = 6999,999 = 7000$ [rad/seg]

c) $W_{on}^2 = \frac{W_{c1} - W_{c2}}{(W_{c2} - W_{c1})^2} = \frac{2000 \cdot 7000}{(7000 - 2000)^2} = 0,56$

a) $W_o = \sqrt{W_{c1} \cdot W_{c2}} = 3741,65738$

b) Valor de Ancho de Banda:

$BW = W_{c2} - W_{c1} = 7000 - 2000 = 5000$ rad/seg.

$BW = a$ $\quad Ro = b$

$a = 5000$ $\quad Ro = 600$

D) $C_1' = \frac{C_1}{W_{on}^2 \cdot a \cdot b} = \frac{662,757\,mF}{0,56 \cdot 5000 \cdot 600} = 394,498\,[nF]$

e) $L_2' = \frac{L_2 \cdot b}{a} = \frac{1,508985H \cdot 600}{5000} = 181,062\,[mH]$

F) $L_3' = \frac{L_3 \cdot b}{W_{on}^2 \cdot a} = \frac{750,052\,mH \cdot 600}{5000 \cdot 0,56} = 160,725\,(mH)$

G) $C_4' = \frac{C_4}{a \cdot b} = \frac{1,33324F}{5000 \cdot 600} = 444,413\,[nF]$

H) $C_5' = \frac{C_5}{W_{on}^2 a \cdot b} = \frac{938,341\,mF}{W_{on}^2 \cdot a \cdot b} = 588,2982\,[nF]$

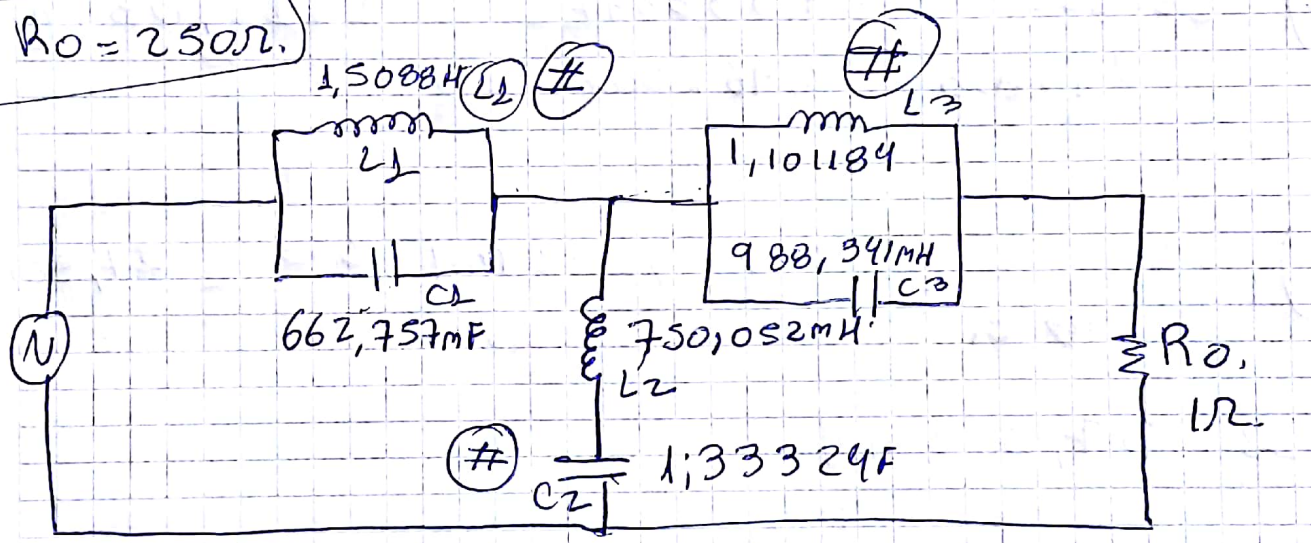
I) $L_5' = \frac{1,0118H \cdot b}{a} = 121,416\,mH$

Filtro elimina Banda normalizado ~~chevyshev~~ Chevyshev.

$F_{c1} = 477,485Hz \Rightarrow w_{c1} = 2\pi \cdot f_{c1} = 3000,126$

$F_{c2} = 1273,24Hz \Rightarrow w_{c2} = 2\pi f_{c2} = 8000,002$

$R_0 = 250\Omega$.



A) $w_0 = \sqrt{w_{c1} \cdot w_{c2}} = \sqrt{3000,126 \cdot 8000,002}$

$w_0 = 4899,082\ [rad/seg]$

B) $BW = w_{c2} - w_{c1} = 5000\ [rad/seg]$

C) $w_{on}^2 = \frac{w_{c1} \cdot w_{c2}}{(w_{c2} - w_{c1})^2} = 0,960$

$a = BW = 5000$ $\quad b = R_0 = 250$

d) $C_1' = \frac{662{,}757\,mF}{a \cdot b} = \frac{C_1}{a \cdot b} = \frac{662{,}757\,mF}{5000 \cdot 250} = 530{,}20\,[nF]$

e) $L_1' = \frac{L_1 \; b}{\omega_0^2 \cdot a} = \frac{1{,}5088\,H \cdot 250}{0{,}96 \cdot 5000} = 78{,}5833\,[mH]$

f) $C_2' = \frac{C_2}{\omega_{on}^2 \cdot a \cdot b} = \frac{1{,}333247}{0{,}96 \cdot 5000 \cdot 250} = 1111{,}039\,[nF]$

g) $L_2' = \frac{L_2 \; b}{a} = \frac{750{,}052\,mH \cdot 250}{5000} = 37{,}5026\,H$

$L_2' = 37{,}502\,[mH]$

h) $C_3' = \frac{C_3}{a \cdot b} = \frac{988{,}34\,mH}{5000 \cdot 250} = 790{,}672\,[nF]$

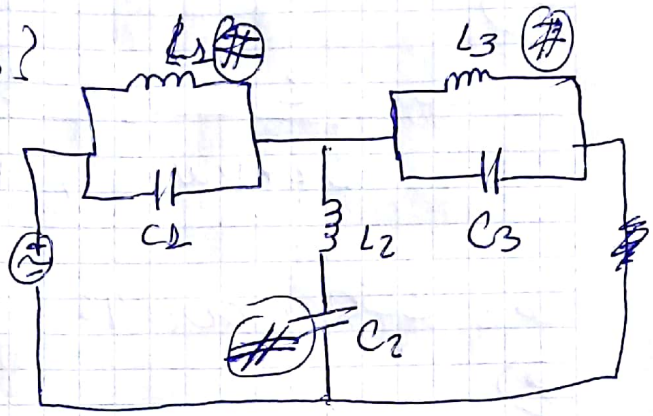
i) $L_3' = \frac{L_3 \cdot b}{a} = \frac{1{,}101184 \cdot 250}{0{,}96 \cdot 5000} = 55{,}0592\,[mH]$

$57{,}35\overline{3}\,mH$

(A) Tengo que dividir por W_{on}^2.

6) Filtro elimina Bandas, normalizado de Chevishiev.

¿Cuales son los componentes?



- $f_{C1} = 477,465$ Hertz
- $f_{C2} = 1273,24$ Hertz.
- $R_0 = 250\Omega$

$W_{C1} = 2.\pi.f_{C1} = 2\pi.\ 477,465 = 3000,001$

$W_{C2} = 2\pi.\ f_{C2} = 2\pi.\ 1273,24 = 8000,002861$

a) $W_0 = \sqrt{W_{C1}.W_{C2}} = 4898,9811$

B) $BW = W_{C2} - W_{C1} = 8000,002861 - 3000,001$

$= 5000,0018$

C) $W_{on}^2 = \dfrac{W_{C1}.W_{C2}}{BW_n^2} = 0,95999$

D) Valor de capacitor "C1'"

$C_1' = \dfrac{C_1}{b\,(R).(BW)_0} = \dfrac{662,757.mF}{250\Omega.\ 5000,0018} = 530,2056[\Omega F]$

B) Valor del inductor "C2'" =

$a = 5000,0018 \qquad b = 250\Omega$

F)
$$C_2' = \frac{C_2}{R \cdot \omega_{on}^2 \cdot BW} = \frac{1,33324F}{250 \cdot 0,95999 \cdot 5000,0018} = 1111,04[\mu F]$$

E)
$$L_1' = \frac{L_1 \cdot b}{\omega_{on}^2 \cdot a} = \frac{1,5088H \cdot 250}{0,95999 \cdot 5000,0018} = 78,584[mH]$$

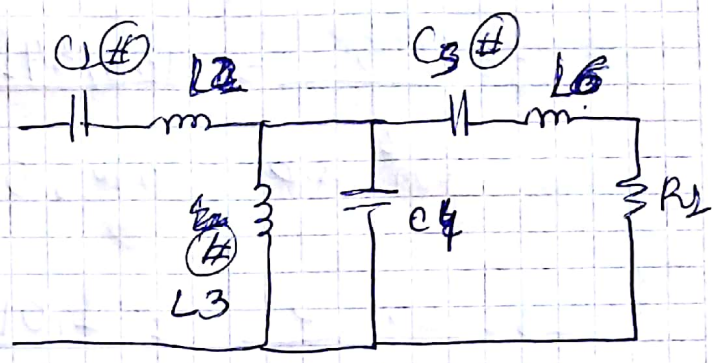
G)
$$L_2' = \frac{L_2 \cdot b}{a} = \frac{750,052mH \cdot 250}{5000,0018} = 37,5025[mH]$$

H)
$$C_3' = \frac{C_3}{a \cdot b} = \frac{988,341mF}{5000,0018 \cdot 250\Omega} = 790,6725[nF]$$

I)
$$L_3' = \frac{L_3 \cdot b}{\omega_{on}^2 \cdot a} = \frac{1,01180H \cdot a}{0,95999 \cdot 5000,0018} = 52,698[mH]$$

9). Filtro Pasa Banda normalizado de Chevrischev

- $f_{C1} = 477,465$ [Hertz]
- $f_{C2} = 1273,24$ [Hertz]
- $R_0 = 600\Omega$



$C_1 = 662,757mF$
$L_2 = 1,50885H$
$L_3 = 750,052mH$
$C_4 = 1,33324F$
$C_5 = 988,341mF$
$L_6 = 1,07180H.$

a) $W_0 = \sqrt{W_{C1} \cdot W_{C2}} =$

$W_{C1} = 2.\pi.477,465 = 3000.$

$W_{C2} = 2\pi . 1273,24 = 8000$

$W_0 = \sqrt{3000 \cdot 8000} = 4898,9799$

b) $BW = W_{C2} - W_{C1} = 8000 - 3000 = \boxed{5000}$

c) $W_{0n}^2 = \frac{W_{C2} \cdot W_{C1}}{BW^2} = 0,96$

d) $C_1' =$ $a = 5000$ $b = 600$

$C_1' = \frac{C_1}{W_{0n}^2 . ab} = \frac{662,757[mF]}{0,96 \cdot 5000 \cdot 600} = 230,123nF$

e) $L_2' = \frac{L_2 . b}{a} = \frac{1,50885H \cdot 600}{5000} = 181,062[mH]$

f) $L_3' = \frac{L_3 . b}{W_{0n}^2 \, a} = \frac{750,052mH \cdot 600}{0,96 \cdot 5000} = 93,7565[mH]$

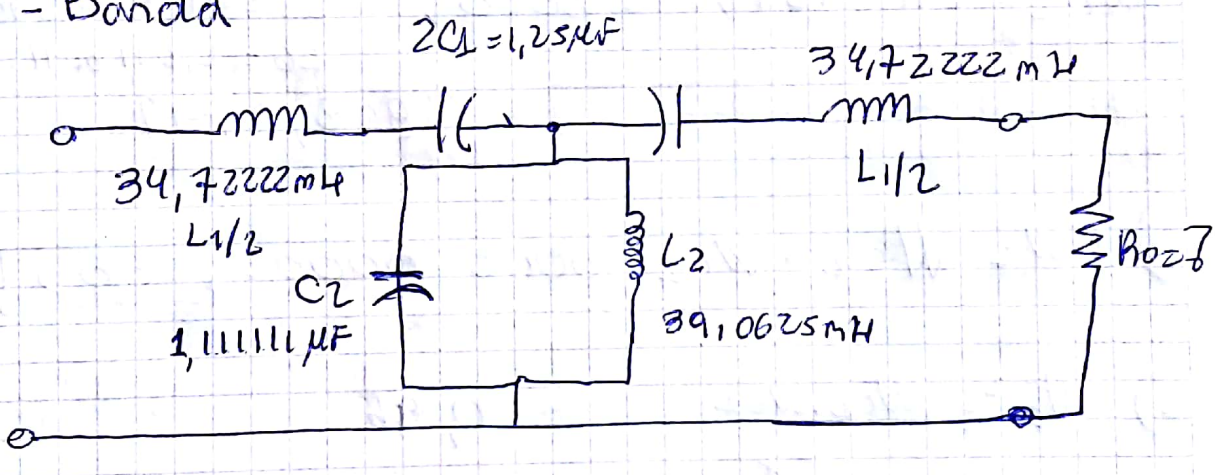
G) $C_4' = \frac{C_4}{W_{on}^2 \, a.b} = \frac{1,33324F}{0,96 . 5000 . 600} = 462,930\ [nF]$

H) $C_5' = \frac{C_5}{W_{on}^2 . a.b} = \frac{988,341mF}{0,96 . 5000 . 600} = 343,1739\ [nF]$

I) $L_5' = \frac{L_5 . b}{a} = \frac{1,01180 \ 600}{5000} = 121,416\ [mH]$

Final 10. Rojas

A) Pasa - Banda



B) $W_o = \frac{1}{\sqrt{L_2 . C_2}} = \frac{1}{\sqrt{39,0625\,mH . 1,111111}} = 4765,809 \approx 4800$

C) $f_o = \frac{W_o}{2\pi} = 758,5020$

D) Ancho de Banda $BW = \frac{2}{\sqrt{L_1 * C_2}} = 7200,00059\ [rad/seg]$