M. Hasyim Abdillah P.   110 1191095

1. $R_s = 100\ \Omega$ $f_c = 100\ MHz$ Sifat : LPF

   $R_L = 1\ k\Omega$ $BW = 20\ MHz$

Dit : Rangkaian IMC bentuk "T"
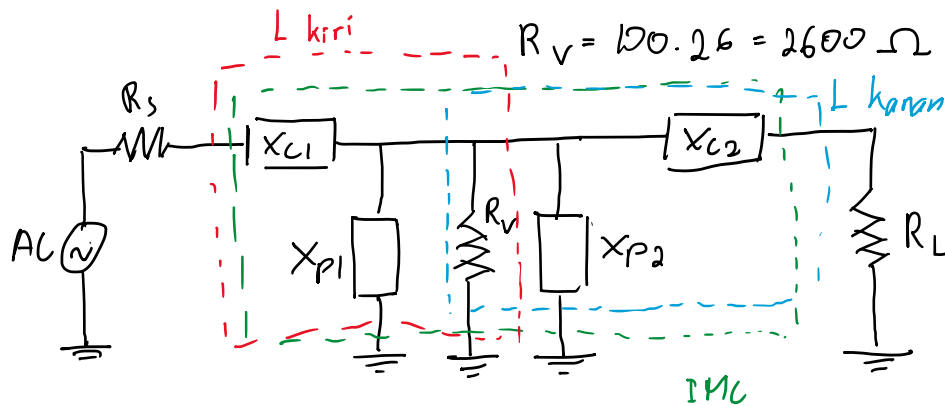
Jawab :

$$Q = \frac{f_c}{BW} = \frac{100\ MHz}{20\ MHz} = 5 \qquad ; \quad R_{kecil} = R_s = 100\ \Omega$$

$$Q = \sqrt{\frac{R_v}{R_{kecil}} - 1} \quad \rightarrow \quad Q^2 = \frac{R_v}{R_s} - 1$$

$$Q^2 + 1 = \frac{R_v}{R_s}$$

$$R_v = R_s(Q^2 + 1) = 100(5^2 + 1)$$

$$R_v = 100 . 26 = 2600\ \Omega$$

"L" kiri

$$Q_{kiri} = \sqrt{\frac{R_p}{R_c} - 1} = \sqrt{\frac{R_v}{R_s} - 1} = 5$$

$$Q_c = \frac{X_{c1}}{R_c} \quad \rightarrow \quad X_{L1} = Q . R_s$$

$$2\pi f L_1 = 5 . 100$$

$$L_1 = \frac{500}{2.3,14. 100 \times 10^6} = 7,96 \times 10^{-7} = 0,796\ \mu H$$

796 nH

$$Q_p = \frac{R_p}{X_{p1}} \quad \rightarrow \quad X_{p1} = \frac{R_v}{Q}$$

$$\frac{1}{2\pi f c} = \frac{2600}{5} \quad \rightarrow \quad C = \frac{1}{2.3,14. 100 \times 10^6 . 520} = 3,06\ pF$$

"L" kanan

$$Q_{kanan} = \sqrt{\frac{R_v}{R_L} - 1} = \sqrt{\frac{2600}{1000} - 1} = 1,26$$

$$Q_c = \frac{X_c}{R_c} \rightarrow X_{c2} = Q_{kanan} \cdot R_L$$

$$2\pi \xi L_2 = 1,26 \cdot 1000$$

$$L_2 = \frac{1260}{2 \cdot 3,14 \cdot 100 \times 10^6} = 2 \ \mu H$$

$$Q_p = \frac{R_p}{X_p} \rightarrow X_{p2} = \frac{R_v}{Q_{kanan}}$$
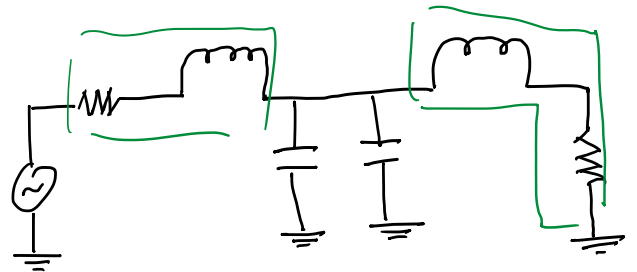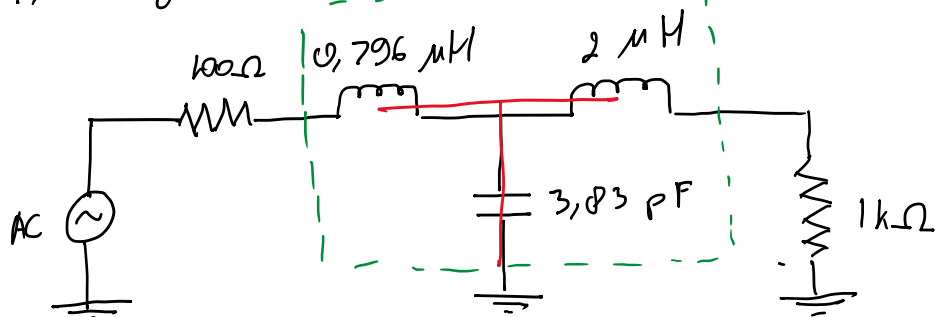
$$\frac{1}{2\pi \xi c} = \frac{2600}{1,26}$$

$$c = \frac{1}{2 \cdot 3,14 \cdot 100 \times 10^6 \cdot 2063,49} = 0,77 \ pF$$
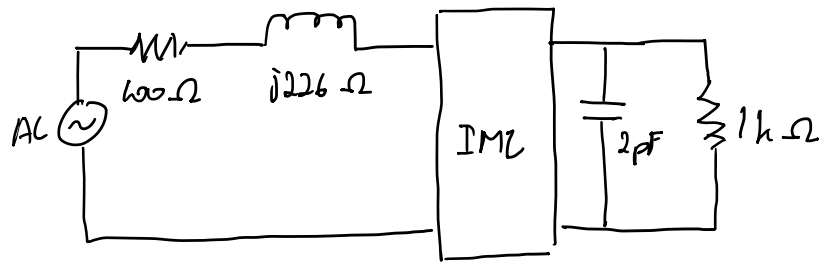
$$X_p = X_{p1} + X_{p2}$$

$$= 3,06 \ pF + 0,77 \ pF$$

$$= 3,83 \ pF$$

Rangkaian IMC bentuk "T"
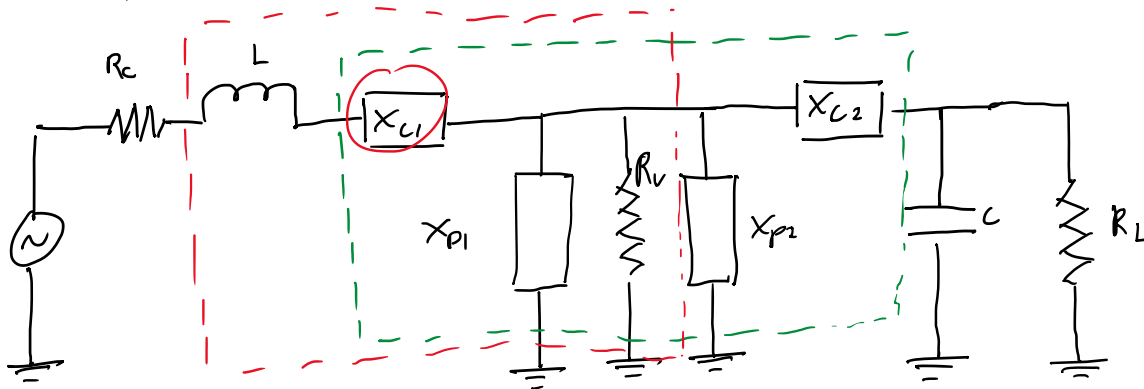
2. Dik :

$$f = 100 \, MHz$$
$$BW = 20 \, MHz$$
$$S_{syst} = LPF$$

Dit · Rangkaian IMC bentuk "T"

Jawab :

$$Q = \frac{S}{BW} = \frac{100 \, MHz}{20 \, MHz} = 5 \qquad ; \qquad R_{kecil} = R_s = 100 \, \Omega$$

$$Q = \sqrt{\frac{R_v}{R_{kecil}} - 1} \quad \rightarrow \quad R_v = R_s(Q^2 + 1) = 100(5^2 + 1) = 2600 \, \Omega$$

* Gunakan jawaban dari soal no. 1

$$X_c \; kiri = j \, 2\pi f \, L_1$$

$$j226 + X_{c1} = j \, 2 . 3{,}14 . 100 \times 10^6 . 0{,}796 \times 10^{-6}$$

$$j226 + X_{c1} = j \, 500{,}14$$

$$X_{c1} = j \, 274{,}14 \; \Omega$$

$$j \, 2\pi f \, L_1' = j \, 274{,}14$$

$$L_1' = \frac{274{,}14}{2 . 3{,}14 . 100 \times 10^6} = 0{,}436 \, \mu H = 436 \, nH$$

* X_p sama dengan no. 1

$$X_p = X_{p1} + X_{p2} = 3,83 \, pF$$

$$X_{capasitor} \quad C = -j \frac{1}{2\pi f C} = -j \frac{1}{2.3,14.100\times10^6.2\times10^{-12}}$$

$$= -j \, 795,77$$

* Gunakan jawaban no. 1

$$X_c \text{ kanan} = j \, 2\pi f L_2 \qquad\qquad X_L = -j \frac{1}{\omega C} = -j \frac{1}{2\pi f C}$$

$$X_{L2} + X_{kapasitor} = j \, 2.3,14.100\times10^6.2\times10^{-6}$$

$$X_{c2} - j795,77 = j \, 1256,64$$

$$X_{c2} = j2052,41$$

$$j2\pi f L_2' = j \, 2052,41$$

$$L_2' = 3,27 \, \mu H$$

Rangkaian IMC bentuk "T"