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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 :

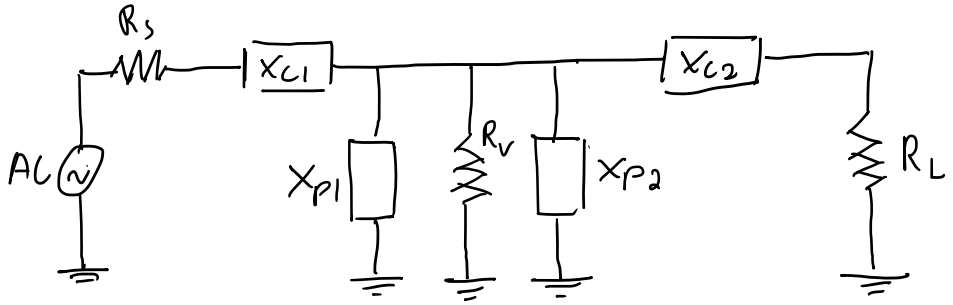
$$Q = \frac{f_c}{BW} = \frac{100\ MHz}{20\ MHz} = 5 \quad ; \quad R_{kecil} = R_S = 100\ \Omega$$

$$Q = \sqrt{\frac{R_V}{R_{kecil}} - 1} \rightarrow Q^2 = \frac{R_V}{R_S} - 1$$

$$Q^2 + 1 = \frac{R_V}{R_S}$$

$$R_V = R_S (Q^2 + 1) = 100 (5^2 + 1)$$

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



"L" kiri

$$Q_{kiri} = \sqrt{\frac{R_P}{R_C} - 1} = \sqrt{\frac{R_V}{R_S} - 1} = 5$$

$$Q_C = \frac{X_{C1}}{R_C} \rightarrow X_{L1} = Q \ . \ R_S$$

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

$$L_1 = \frac{500}{2 . 3,14 . 100 \times 10^6} = 7,96 \times 10^{-7} = 0,796\ \mu H$$

$$Q_P = \frac{R_P}{X_{P1}} \rightarrow X_{P1} = \frac{R_V}{Q}$$

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

"L" kanan

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

$$Q_L = \frac{X_L}{R_L} \rightarrow X_{L2} = Q_{kanan} \cdot R_L$$

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

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

$$Q_p = \frac{R_p}{X_p} \rightarrow X_{p2} = \frac{R_V}{Q_{kanan}}$$

$$\frac{1}{2\pi f C} = \frac{2600}{1,26}$$

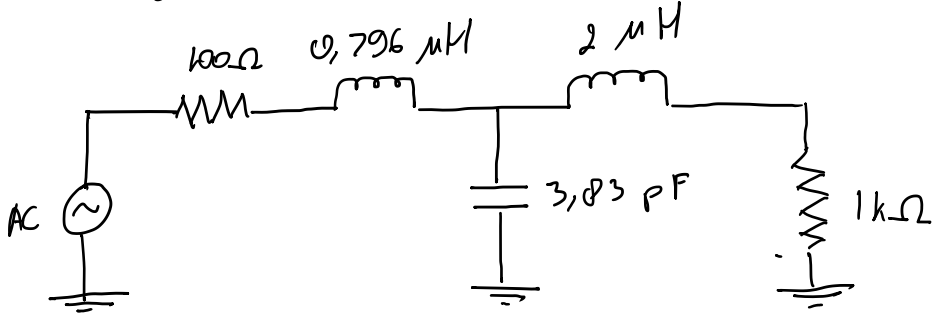
$$C = \frac{1}{2 \cdot 3,14 \cdot 100 \times 10^6 \cdot 2063,49} = 0,77\ pF$$

$$X_p = X_{p1} + X_{p2}$$

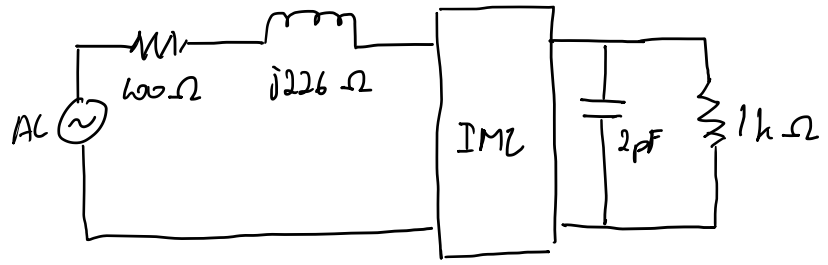
$$= 3,06\ pF + 0,77\ pF$$

$$= 3,83\ pF$$

Rangkaian IMC bentuk "T"



2. Dik :



$f = 600\ MHz$

$BW = 20\ MHz$

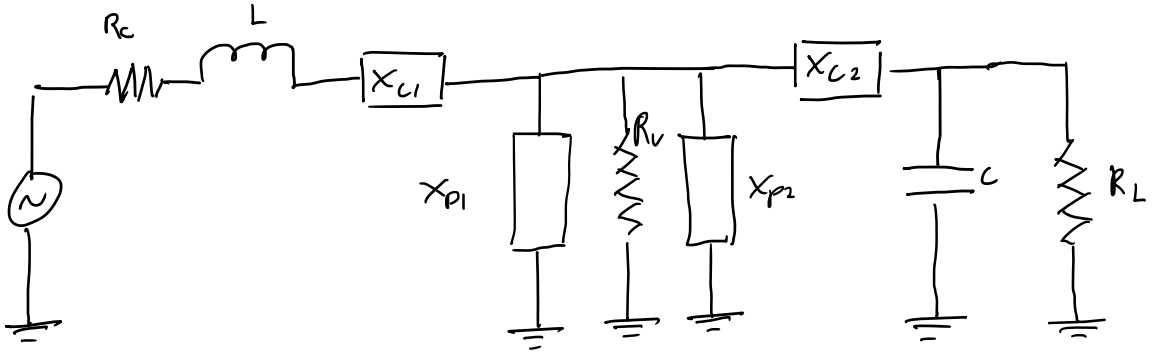
f_{sat} = LPF

Dit : Rangkaian IMC bentuk "T"

Jawab :

$$Q = \frac{f}{BW} = \frac{600\ MHz}{20\ MHz} = 5 \quad ; \quad R_{kecil} = R_s = 100\ \Omega$$

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



* Gunakan jawaban dari soal no. 1

X_C kiri $= j 2\pi f L_1$

$j226 + X_{C1} = j\ 2 . 3{,}14 . 100 \times 10^6 . 0{,}796 \times 10^{-6}$

$j226 + X_{C1} = j\ 500{,}14$

$X_{C1} = j\ 274{,}14$

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

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

* X_p sama dengan no. 1

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

$$X_{capasitor\ C} = -j\frac{1}{2\pi f C} = -j\frac{1}{2 \cdot 3{,}14 \cdot 100 \times 10^6 \cdot 2 \times 10^{-12}}$$

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

* Gunakan jawaban no. 1

X_c kanan $= j\,2\pi f L_2$

$$X_{c2} + X_{kapasitor} = j\,2 \cdot 3{,}14 \cdot 100 \times 10^6 \cdot 2 \times 10^{-6}$$

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

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

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

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

Rangkaian IMC bentuk "T"