M. Hasyim Abdillah P.

1. Dik : $R_s = 2\ k\Omega$ $\quad f = 50\ MHz$

$R_L = 100\ \Omega$ $\quad$ fisat : meloloskan sinyal DC

Dit : Rangkaian IMC

Jawab :

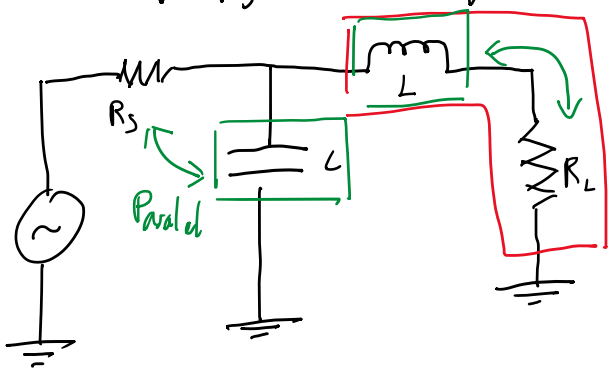
Meloloskan sinyal DC → bersifat LPF

karena $R_L < R_s$, maka :

$R_p = R_s = 2000\ \Omega$ $\quad R_p \rightarrow$ R paralel

$R_s = R_L = 100\ \Omega$ $\quad R_s \rightarrow$ R seri

$$Q_s = Q_p = \sqrt{\frac{R_p}{R_s} - 1} = \sqrt{\frac{2000}{100} - 1} = \sqrt{19}$$



LPF seri dgn L

HPF seri dgn C

$X_L = 2\pi f L = \omega L$

$X_C = \frac{1}{2\pi f C} = \frac{1}{\omega C}$

Impedansi seri

$$Q_s = \frac{X_s}{R_s} \rightarrow X_s = Q_s \cdot R_s$$

$$2\pi f L = Q_s \cdot R_s$$

$$L = \frac{Q_s \cdot R_s}{2\pi f} = \frac{\sqrt{19} \cdot 100}{2 \cdot 3{,}14 \cdot 50 \times 10^6} = 1{,}39 \times 10^{-6}\ H$$

$$L = 1{,}39\ \mu H$$

$m = 10^{-3}$

$\mu = 10^{-6}$

$n = 10^{-9}$

$p = 10^{-12}$

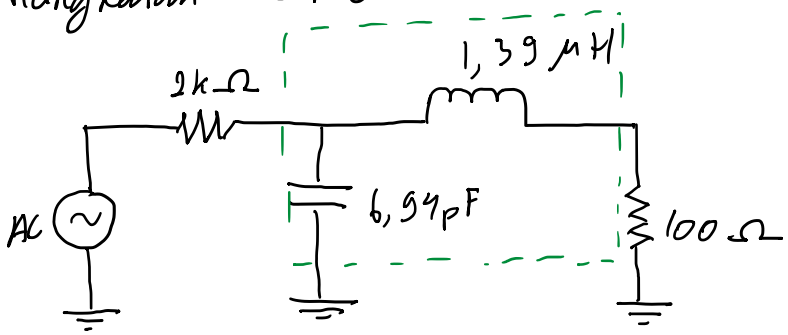
$$Q_p = \frac{R_p}{X_p} \rightarrow X_p = \frac{R_p}{Q_p}$$

Impedansi paralel

$$\frac{1}{2\pi f C} = \frac{R_p}{Q_p}$$

$$C = \frac{Q_p}{2\pi f R_p} = \frac{\sqrt{19}}{2 \cdot 3{,}14 \cdot 50 \times 10^6 \cdot 2000} = 6{,}94\ pF$$

Rangkaian IMC :

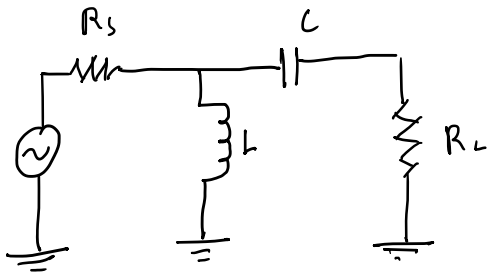


2. Dik : $R_S = 2k\Omega$ $f = 50\ MHz$

$R_L = 100\ \Omega$ Sifat : memblokir sinyal DC

Dit : Rangkaian IMC

Jawab :



Sifat → HPF

$R_p = R_S = 2000\ \Omega$

$R_S = R_L = 100\ \Omega$

$$Q_s = Q_p = \sqrt{\frac{R_p}{R_S} - 1} = \sqrt{\frac{2000}{100} - 1} = \sqrt{19}$$

$$Q_s = \frac{X_S}{R_S} \rightarrow X_S = Q_S \cdot R_S$$

$$\frac{1}{2\pi f C} = Q_S \cdot R_S$$

$$C = \frac{1}{2\pi f C . Q_S R_S} = \frac{1}{2 . 3{,}14 . 50\times10^6 . \sqrt{19} . 100} = 7{,}3\ pF$$

$$Q_p = \frac{R_p}{X_p} \rightarrow X_p = \frac{R_p}{Q_p}$$

$$2\pi f L = \frac{R_p}{Q_p}$$

$$L = \frac{R_p}{2\pi f . Q_p} = \frac{200}{2 . 3{,}14 . 50\times10^6 . \sqrt{19}} = 1{,}46\ \mu H$$

Rangkaian IMC :