

Solusi (dengan perhitungan, metode Absorbsi)

(a) Rangkaian, π , sifat HPF:



$f = 50 \text{ MHz}$

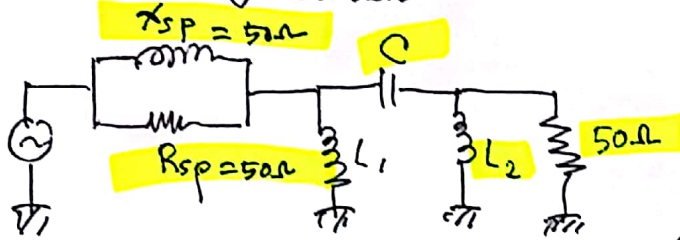
Konversi: Z_{seri} ke paralel (dari π)

$Q_s = \frac{X_s}{R_s} = \frac{25}{25} = 1 \quad (= Q = Q_p)$

$R_{sp} = R_s(1 + Q^2) = 25(1 + 1^2) = 50 \Omega$

$X_{sp} = X_s(1 + \frac{1}{Q^2}) = 25(1 + \frac{1}{1^2}) = 50 \Omega$

↓ ekuivalen



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

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

(b) Mencari besarnya komponen:

* Menentukan R_v

$(R_b = R_{sp} = 50 \Omega), Q = 5$

$$Q = \sqrt{\frac{R_b}{R_v} - 1} \Rightarrow Q^2 + 1 = \frac{R_b}{R_v} \Rightarrow R_v = \frac{R_b}{Q^2 + 1} = \frac{50}{25 + 1} = 1,92 \Omega$$

* IMC-1: Menyepadankan Z_s (paralel) dg R_v

$Q_1 = \sqrt{\frac{R_p}{R_s} - 1} = \sqrt{\frac{50}{1,92} - 1} = 5 \Rightarrow Q_{s1} = Q_{p1} = Q_1$

$Q_{s1} = \frac{X_{s1}}{R_{s1}} \Rightarrow X_{s1} = R_{s1} \cdot Q_{s1} = R_v \cdot Q_1 = 1,92 \times 5 = 9,6 \Omega$

$C_1 = \frac{1}{2 \cdot \pi \cdot 50 \cdot 10^6 \cdot 9,6} = 3,3 \times 10^{-10} \text{ F} = 330 \text{ pF}$

$Q_{p1} = \frac{R_{p1}}{X_{p1}} \Rightarrow X_{p1} = \frac{R_{p1}}{Q_{p1}} = \frac{R_{sp}}{Q_1} = \frac{50}{5} = 10 \Omega$

$L = \frac{10}{2 \cdot \pi \cdot 50 \cdot 10^6} = 3,18 \cdot 10^{-8} \text{ H} = 31,8 \text{ nH}$

Absorbsi:

$X_{sp} // X_{p1}^* = X_{p1} = 10 \Omega$

$\frac{1}{50} + \frac{1}{X_{p1}^*} = \frac{1}{10} \Rightarrow \frac{1}{X_{p1}^*} = \frac{1}{10} - \frac{1}{50} = \frac{4}{50}$

$X_{p1}^* = \frac{50}{4} = 12,5 \Omega$

$L_1 = \frac{12,5}{2 \cdot \pi \cdot 50 \cdot 10^6} = 398 \cdot 10^{-9} \text{ H} = 398 \text{ nH}$

