



Verilen sinüzoidal osilatör devresinin frekans ifadesini bulunuz. Yükselteç kazancı koşulu hesaplayınız. Osilasyon frekansı, $R_1 = ?$

$$A_v = \left(1 + \frac{R_2}{R_1}\right) \quad \beta = \frac{V_f}{V_o} \rightarrow \frac{Z_2}{Z_2 + Z_1}$$

$$Z_1 = R + \frac{1}{j\omega C} = \frac{1 + j\omega RC}{j\omega C} \quad Z_2 = \frac{1}{j\omega C + \frac{1}{R}} = \frac{R}{1 + j\omega CR}$$

$$\alpha = j\omega R \rightarrow Z_1 = \left(\frac{1 + j\alpha}{j\alpha}\right) \cdot R \quad Z = \frac{R}{1 + j\alpha}$$

$$Z_1 + Z_2 = \frac{R + jR\alpha}{j\alpha} + \frac{R}{1 + j\alpha} = \frac{R + 3jR\alpha - R\alpha^2}{j\alpha - \alpha^2}$$

$$\beta = \frac{R}{1 + j\alpha} \cdot \frac{\alpha(j - \alpha)}{R(1 + 3j\alpha - \alpha^2)} \Rightarrow \alpha = 1 \quad \frac{j-1}{(1+j) \cdot 3j} = \frac{j-1}{3j-3} = \frac{1}{3}$$

$$f_0 = \frac{1}{2\pi \cdot 10 \cdot 10^3 \cdot 10 \cdot 10^{-4}} = 1,59 \text{ kHz}$$

$$A_v = 1 + \frac{10}{R_1} = 3 \quad R_1 = 5 \text{ k}$$

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