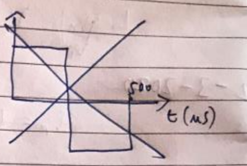
$V_0 = -j\omega R C_f V$

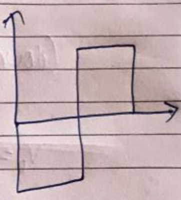
$= -j\omega \times 2\times10^3 \times 0.1\times10^{-6} \times V_i$

$= -2\times10^{-4} \times \frac{dV}{dt}$



$\cancel{= \frac{-2 \times 10^{-4}}{250\times10^{-6}} = -8\times10^{-7}\ V = -0.8}$

$= -2\times10^{-4} \times \frac{2}{250\times10^{-6}} = -1.6\ V$



Q $Z_p = \frac{13\times10^3}{1+j\omega R_2 C_2} = \frac{13\times10^3}{1+j\omega\times60.45\times10^{-6}}$

$Z_s = \frac{1+j\omega\times37.5\times10^{-6}}{j\omega\times7.5\times10^{-9}}$

$\beta = \frac{Z_p}{Z_p+Z_s} = \frac{j\omega\times7.5\times10^{-9}\times13\times10^3}{j\omega\times7.5\times10^{-9}\times13\times10^3 + 1 + j\omega\times60.45\times10^{-6} + j\omega\times37.5\times10^{-9} - \omega^2\times453.375\times10^{-15}}$

$= \frac{j\omega\times7.5\times13\times10^{-6}}{1+j\omega(7.5\times10^{-9}\times13\times10^3+60.45\times10^{-6}+37.5\times10^{-9}) - \omega^2\, 453.375\times10^{-15}}$

$\omega^2\times \cancel{453.375}\,2266.875\times10^{-12} = 1$

$\cancel{\omega = 3.35\ kHz}$ $\omega = 0.021\times10^6$

$\cancel{\beta = \frac{97.5}{195.45} = 0.498}$

$\beta = \frac{97.5}{97.5+60.45+37.5} = \frac{97.5}{195.45} = 0.498$

$f = \frac{1}{2\pi\sqrt{R_1C_1R_2C_2}} = \boxed{3.35\ kHz}$

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Q3 $V_o = \frac{R_1}{R_1+R_2} V_{ref} + \frac{R_2}{R_1+R_2} V_{sat}$

↳ $\frac{10}{100} \times 10 = 1$, -1 , $\frac{2\times10}{100} \times 10 = 2$

↳ $\frac{90}{100} \times 4 + \frac{10}{100} \times 10 = 4.6$, $3.6 - 1 = 2.6$, 2