

$$\frac{8000 \left( \frac{1-z^{-1}}{1+z^{-1}} \right)}{8000 \left( \frac{1-z^{-1}}{1+z^{-1}} \right) + 8000}$$

$$= \frac{8000 - 8000 z^{-1}}{16000}$$

$$= \frac{1}{2} - \frac{1}{2} z^{-1}$$

$$y(n) = \frac{1}{2} x(n) - \frac{1}{2} x(n-1)$$

For  $f_s = 10000 \text{ Hz}$

$$\begin{aligned} \omega_p &= 20000 \tan(0.1\pi) \\ &= 6498.39 \end{aligned}$$

$$\begin{aligned} \omega_s &= 20000 \tan(0.025\pi) \\ &= 2208.02 \end{aligned}$$

$$N = \frac{\log 3}{\log \left( \frac{6498.39}{2208.02} \right)} \approx 1$$

$$H(s) = \frac{s}{s + 6498.39}$$

$$H(z) = \frac{20000 - 20000 z^{-1}}{26498.39 - 135022 z^{-1}}$$

$$\therefore y(n) = 0.503 y(n-1) + 0.754 x(n) - 0.754 x(n-1)$$