$\alpha_p = 3dB \qquad \alpha_s = 10dB$

$\omega_c = 2 \times \pi \times 1000 = 2000\pi$ rad/sec

$\omega_s = 2 \times \pi \times 350 = 700\pi$ rad/sec

$T = \frac{1}{f} = \frac{1}{5000} = 2 \times 10^{-4}$ sec

$\Omega_p = \frac{2}{T} \tan \frac{\omega_p T}{2} = \frac{2}{2 \times 10^{-4}} \tan\left(\frac{2000\pi \times 2 \times 10^{-4}}{2}\right)$

$= 7265$ rad/sec

$\Omega_s = \frac{2}{T} \tan \frac{\omega_s T}{2} = \frac{2}{2 \times 10^{-4}} \tan\left(\frac{700\pi \times 2 \times 10^{-4}}{2}\right)$

$= 02235$ rad/sec

Order of Filter

$$N = \frac{\log \sqrt{\left(\frac{10^{0.1\alpha_s} - 1}{10^{0.1\alpha_p} - 1}\right)}}{\log \frac{\Omega_s}{\Omega_p}} = \frac{\log 3}{\log 3.25} = 0.932$$

$\Omega_c = 1$ rad/sec $\rightarrow H(s) = \frac{1}{1+s}$

$\therefore \Omega_c = \Omega_p = 7265$ rad/sec

$s = \frac{\Omega_c}{s}$ or $s \rightarrow \frac{7265}{s}$

$$H(s) = \frac{1}{s+1}$$

$$\frac{1}{s + 7265}$$

Apply Bilinear transform:

$$H(z) = H(s)\Big|_{s = \frac{2}{T}\left(\frac{1 - z^{-1}}{1 + z^{-1}}\right)}$$

$$= \frac{1}{s + 7265}\Bigg|_{s = \frac{2}{2 \times 10^{-4}}\left(\frac{1 - z^{-1}}{1 + z^{-1}}\right)}$$

$$\frac{1}{10000\left(\frac{1 - z^{-1}}{1 + z^{-1}}\right) + 7265}$$

$$= \frac{0.5722\left(1 - z^{-1}\right)}{1 - 0.1584 z^{-1}}$$