Page No.
Date

Solution :

Given $\alpha_p = 3dB$; $\omega_p = \omega_p = 2 \times \pi \times 1000$

$= 2000\pi$ rad/sec

$\alpha_s = 10dB$; $\omega_s = 2 \times \pi \times 350 = 700\pi$ rad/sec

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

The characteristics are monotonic in both passband and stopband. Therefore, the filter is Butterworth filter.

prewraping the digital frequencies we have

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

$$= 10^4 \tan(0.2\pi) = 7265 \text{ rad/sec}$$

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

$$= 10^9 \tan(0.07\pi) = 2235 \text{ rad/sec}$$

First we design a lowpass filter for the given specifications & use suitable