Digital Systems and Designs

Tutorial 4

Question 01

Design a Chabyshev IIR digital low-pass filter to satisfy the constraints.

$0.707 \leq |H(\omega)| \leq 1, \quad 0 \leq \omega \leq 0.2\pi$

$|H(\omega)| \leq 0.1, \quad 0.5\pi \leq \omega \leq \pi$

Using bilinear transformation and assuming T = 1s.

Question 02

Determine the lowest order of Chebyshev filter that meets the following specifications:

(i) 1 dB ripple in the passband $0 \leq |\omega| \leq 0.3\pi$

(ii) Atleast 60 dB attenuation in the stopband $0.35\pi \leq |\omega| \leq \pi$

Use the bilinear transformation.

Question 03

Determine the system function $H(z)$ of the lowest order Chebyshev IIR digital filter with the following specifications:

3 dB ripple in passband $0 \leq \omega \leq 0.2\,\pi$

25 dB attenuation in stopband $0.45\pi \leq \omega \leq \pi$