



ISRA UNIVERSITY

Islamabad Campus

Department of Electrical Engineering

Program: B.E. (Electrical)

Semester – Spring 2016

EL-322 Digital Signal Processing

Assignment – 4 & 5

Marks: 20

Due Date: 01/05/2016

Handout Date: 25/05/2016

Question # 1:

- a) We wish to design a discrete time low pass filter using the bilinear transformation on a continuous-time ideal low pass filter. Assume that the continuous time prototype filter has cutoff frequency $\Omega_c = 2\pi(2000)rad/s$ and we choose the bilinear transformation parameter $T=0.4ms$. What is the cutoff frequency ω_c for the resulting discrete-time filter?
- b) For the analog transfer function

$$H_a(s) = \frac{2}{(s+1)(s+3)}$$

Determine $H(z)$ if $T=1s$, using Impulse Invariance method.

Question # 2:

We wish to design an FIR low pass filter satisfying the specifications:

$$0.98 < H(e^{j\omega}) < 1.02, \quad 0 \leq |\omega| \leq 0.63\pi$$

$$-0.15 < H(e^{j\omega}) < 0.15, \quad 0.65 \leq |\omega| \leq \pi$$

By applying a Kaiser window to the impulse response $h_d(n)$ for the ideal discrete time low pass filter with cutoff $\omega_c = 0.64\pi$. Find the values of β and M required to satisfy this specification. ($\delta = 0.02$).

Good Luck