Shri Mata Vaishno Devi University School of Electronics and Communication Engineering

Major Examination (Dec 2022) Sub: Digital Signal Processing (ECL 2040)

Class: B Tech ECE 5th SEM (2020 Batch) Max Time: 3 Hrs Max marks: 50

Note: Attempt all questions

Section A

Q1. Elaborate the following:

A. Fixed point and Floating-point number representation
B. Quantization noise
C. coefficient quantization error
D. FIR Filter Structures
E. DFT and FFT

(4*5= 20 marks)

Section B

Q2.

For the analog transfer function, $H(s) = \frac{(s+1)}{(s+2)(s+4)}$, determine $H(z)$ using impulse invariant transformation if (a) $T = 1$ second and (b) $T = 0.5$ second.

(5+5 = 10 marks)

Q3.

The desired frequency response of a low-pass filter is

$$H_d(e^{j\omega}) = \begin{cases} 1 & -\pi/2 < \omega \le \pi/2 \\ 0 & \pi/2 < |\omega| < \pi \end{cases}$$

Determine $h(n)$. Also determine $h(n)$ using the symmetric rectangular window with window length of 7.

(10 marks)

Q4.

Explain in detail the Fourier Series method for FIR filters design. Justify how we obtain a causal filter with this method.

(10 marks)

Course Outcomes:

1. To learn discrete Fourier transform and its properties
2. To know the characteristics of IIR and FIR filters, learn the design of infinite and finite impulse response filters for filtering undesired signals.
3. To understand Finite word length effects.

Shri Mata Vaishno Devi University School of Electronics and Communication Engineering

Major Examination (Dec 2022) Sub: Digital Signal Processing (ECL 2040)

Class: B Tech ECE 5th SEM (2020 Batch) Max Time: 3 Hrs Max marks: 50

Note: Attempt all questions

Section A

Q1. Elaborate the following:

A. Fixed point and Floating-point number representation
B. Quantization noise
C. coefficient quantization error
D. FIR Filter Structures
E. DFT and FFT

(4*5= 20 marks)

Section B

Q2.

For the analog transfer function, $H(s) = \frac{(s+1)}{(s+2)(s+4)}$, determine $H(z)$ using impulse invariant transformation if (a) $T = 1$ second and (b) $T = 0.5$ second.

(5+5 = 10 marks)

Q3.

The desired frequency response of a low-pass filter is

$$H_d(e^{j\omega}) = \begin{cases} 1 & -\pi/2 < \omega \leq \pi/2 \\ 0 & \pi/2 < |\omega| < \pi \end{cases}$$

Determine $h_d(n)$. Also determine $h(n)$ using the symmetric rectangular window with window length of 7.

(10 marks)

Q4.

Explain in detail the Fourier Series method for FIR filters design. Justify how we obtain a causal filter with this method.

(10 marks)

Course Outcomes:

1. To learn discrete Fourier transform and its properties
2. To know the characteristics of IIR and FIR filters, learn the design of infinite and finite impulse response filters for filtering undesired signals.
3. To understand Finite word length effects.