www.aktuonline.com

Printed Pages : 4

EEN011

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 121657

Roll No.

B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15

FUNDAMENTALS OF DIGITAL SIGNAL PROCESSING

Time : **3** Hours] [Total Marks : **100**

1 Attempt any FOUR parts 5×4=20

(a) What are the differences between DFT and DTFT?

(b) Find the circular convolution of two sequences: $x(n)=\{1,2,2,1\}$ and $y(n) = \{1,2,3,1\}$ using matrix method.

(c) Realize the system given by difference equation $y(n) = -0.1\, y(n-1) +0.72\, y(n-2)+0.7\, x(n)-0.252x(n-2)$ in parallel form.

(d) List the advantages of digital Signal Processing over Analog signal Processing.

(e) What are the differences between the Impulse invariant and bilinear response? Explain the importance of the poles in Butterworth and Chebyshev filters.

(f) How the product of two DFT's result in circular convolution ?

www.aktuonline.com

2 Attempt any TWO parts 10×2=20

(a) Compute the circular convolution of the following sequences using DFT and IDFT

$x(n)= \{1,2,3,1\}$ $h(n) = (4,3,2,2\}$

(b) A certain discrete-time LTI filter has the following data

(a) Poles are at 0.2 and 0.4

(b) Zeros are at -0.4 and origin

(c) Gain of filter is 0.5

Find the cascade form of realization.

(c) Why DFT is preferred over Fourier transform? Explain with suitable example. What are the various properties of the DFT?

3 Attempt any TWO parts 10×2=20

(a) Derive the signal to noise ratio of the A/D converters. Compare the truncation and rounding errors using fixed point and floating point representation.

(b) What are the various sampling techniques are used in DSP ? How the reconstruction takes place? Explain them briefly.

(c) Why discrete time processing of continuous time signals, continuous time processing of discrete time signals is required? Explain with suitable examples.

www.aktuonline.com

4 Attempt any TWO parts 10×2=20

(a) A low pass filter is to be designed with the followving desired frequency response

$$\begin{cases} e^{-j2\omega}, & -\pi/4 \le \omega \le \pi/4 \end{cases}$$

$$Hd(e^{j\omega}) = \{$$

$$\begin{cases} 0, & \pi/4 < |\omega| \le \pi \end{cases}$$

Find the filter coefficients $H_d(n)$ if the Window Function is defined as

$$\begin{cases} 1, & 0 \le n \le 4 \end{cases}$$

w(n) =

$$\begin{cases} 0, & \text{Otherwise} \end{cases}$$

(b) Describe for the design of FIR filters. What are advantages and disadvantages of Kaiser Window method over other filters?

(c) Design a digital Butterworth filter that satisfies the following constraint using bilinear Transformation.

Assume T=ls.

$$0.9 < {}^{1}H(e^{jw}1 \le 1 \quad 0 \le \omega \le \pi/2$$

$${}^{1}H(e^{jw}1 \le 0.2 \quad 3\pi/4 \le \omega \le \pi$$

www.aktuonline.com

5 Attempt any TWO parts 10×2=20

(a) Find DFT of the two sequence using only FFT flow graph X_1 (n)={1,1,1,1), X_2(n)={2,1,2,1)

(b) Find the DFT of the sample data sequence

X(n)={1,1,2} and compute the corresponding amplitude and phase spectrum.

(c) The Five samples of 9 point DFT are given as follows:

X(0)=23, X(1)=2.242.-j, X(4)=-6.379+j4.121

X(6)=6.5+j2.59, X(7)=-4.153+j0.264

Find the other four DFT's.