Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name : Digital Signal Processing

Subject Code : 4TE06DSP1 Branch: B.Tech (IC)

Semester : 6 Date : 19/04/2017 Time : 02:30 To 05:30 Marks : 70

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 Attempt the following questions: **(14)**

a) Which of the following is used in the realization of a system? 01
a) Delay elements b) Multipliers c) Adders d) All of the above

b) The lack of precise control of cutoff frequencies is a disadvantage of which of the following designs? 01
a) Window design b) Chebyshev approximation
c) Frequency sampling d) None of the Above

c) Which of the following is true regarding the number of computations required for direct computing an N-point DFT? 01
a) N^2 complex multiplications and N(N-1) complex additions
b) N^2 complex additions and N(N-1) complex multiplications
c) N^2 complex multiplications and N(N+1) complex additions
d) N^2 complex additions and N(N+1) complex multiplications

d) Which of the following methods is not used find out inverse z transform? 01
(a) Cauchy Rihemen's theorem (b) Long division method.
(c) Partial function. d) Taylor Series

e) Finite Impulse Response (FIR) is a 01
a) feedforward filter b) feedback filter c) Both a & b d) none of these

f) The filter coefficients are stored in: 01
a) binary registers b) digital system c) hex memory d) none of above

g) How many multiplication are required to compute N point DFT using radix 2 FFT? 01
a) $N\log_2 N$ b) $N/2 \log_2 N$ c) N^2 d) None of these

h) How many additions are required to compute N point DFT using radix 2 FFT? 01
a) $N\log_2 N$ b) $N/2 \log_2 N$ c) N^2 d) None of these

i) Consider two finite duration sequences x(n) and h(n) of duration L samples and M samples then the linear convolution of these two sequences produces an output sequence of duration _____ 01

a) L+M-1 samples b) L c) M None of these

j) Consider two finite duration sequences x(n) and h(n) of duration L samples and M samples then the Circular convolution of these two sequences produces an output sequence of duration _____ 01

a) L+M-1 samples b) L c) N=max(L,M) None of these

k) IIR filters 01

a) Use feedback b) Are sometimes called recursive filters

c) Can oscillate if not properly designed d) all of the above

l) FIR filters have ……., and IIR filters have ……. 01

a) Zeros, poles & zeros b) Poles & zeros, Zeros c) Zeros, zeros d) None of above

m) Let the sequence x (n) has a length L. If we want to find the N-point DFT(N>L) of the sequence x(n), we have to add (N-L) zeros to the sequence x(n). This is known as_____ 01

a) Zero padding b) Overlap Add Method c) Circular convolution d) Linear convolution

n) The process of quantization introduces 01

a) Error b) Noise c) Power d) None of the above

Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions **(14)**

a) What are the differences and similarities between analog and digital signal processing? 05

b) Compute the 4-point DFT of sequence x(n)={0,1,2,3}. 05

c) Using bilinear transformation method obtain H(z) for the given analog filter $\mathbf{H_a(s)=1/(s+1)^2}$ with T=0.1s. 04

Q-3 Attempt all questions **(14)**

a) Sketch the block diagram representation of the discrete time system described by the input-output relation where x(n) is the input and y (n) is the output of the system. 05

$$y(n) = \frac{1}{4}\, y\,(n-1) + \frac{1}{2}\, x\,(n) + \frac{1}{2}\, x\,(n-1)$$

b) Explain the magnitude characteristics of a physical realizable filter using suitable diagram. 05

c) Explain similarity and differences between Linear and Circular convolution. 04

Q-4 Attempt all questions **(14)**

a) Perform Linear Convolution of {1,3,1) and (1,2,2,). 05

b) Realize the following system function by linear phase FIR filter 05

$\mathbf{H(z)= ½ + 1/3\ z^{-1} + z^{-2} +1/4\ z^{-3} +z^{-4}+1/3z^{-5} +1/2z^{-6}}$

	c)	Give the difference between FIR & IIR filter.	04
Q-5		**Attempt all questions**	**(14)**
	a)	Compute the length-4 sequence from its DFT which is given by X(k)={4,1-j,-2,1+j}.	05
	b)	Explain in brief Hamming window with suitable diagram.	05
	c)	What is the relationship between z-transform and the discrete Fourier transform?	04
Q-6		**Attempt all questions**	**(14)**
	a)	Perform Circular Convolution of {1,2,3,1} & {4,3,2,2}.	05
	b)	Give the differences between Analog filter and digital filter.	05
	c)	Enlist different properties of discrete fourier transform.	04
Q-7		**Attempt all questions**	**(14)**
	a)	Explain in detail different types of structures of an FIR filter that can be realized.	07
	b)	Write a note on radix-2 Decimation in Time FFT.	07
Q-8		**Attempt all questions**	**(14)**
	a)	Explain different types of structures of an IIR filter that can be realized.	07
	b)	Write a short note on radix-2 Decimation in Frequency FFT.	07