Reg. No : | | | | | | | | | |

Question Paper Code : 19EE3A

B.E / B.Tech DEGREE EXAMINATION, NOV / DEC 2021

Fifth Semester

EE19503 - DISCRETE TIME SYSTEMS AND SIGNAL PROCESSING

Electrical and Electronics Engineering

(Regulations 2019)

Time : Three Hours Maximum : 100 Marks

Answer ALL Questions

PART A (10 x 2 = 20 Marks)

1. How do you prevent aliasing while sampling a continuous time signal?
2. Analyze whether the given signal X(n)=sin (π/4n) is power, energy or neither energy nor power signal.
3. Compute the DFT of a sequence $(-1)^n$ for N=4.
4. Construct the flow graph of a two-point radix-2 DIT FFT.
5. Influence the specifications, αp = 1dB, αs= 30dB, Ωp = 200 rad/sec, Ωs = 600rad/sec. Determine the order of the filter.
6. Give the bilinear equation between s-plane and z-plane?
7. What are the desirable characteristics of the window?
8. Write the properties of FIR filter?
9. Classify the different buses of TMS320c5x?
10. List the applications of digital signal processors.

PART B (5 x 13 = 65 Marks)

11. a. Compute the following systems are Linearity, causality, dynamicity:
(i) y (n) = $(x(n))^2$, (ii) y(n) = cos x(n), (iii) y(n)=5x(n)+2x(n)+1 (iv) y(n)=x(2n)

(OR)

b. Determine the unit step response of the system whose difference equation is y(n)-0.7y(n-1)+0.12y(n-2)=x(n-1)+x(n-2) if y(-1) = y(-2)=1.

12. a. How would you solve the DFT of X(n) = { 1 for $-3 \leq n \leq 3$ using radix-2 DIT FFT.
0 otherwise

(OR)

b. (i) Find the IDFT of the sequence X(k) = {5,0,1-j,0,1,0,1+j,0). (7)

(ii) Find the circular convolution of x1(n)={1,2,2,1} and x2(n)={1,2,3,1} using concentric circle method. (6)

13. a. Using the bilinear transformation, design a highpass filter, Monotonic in passband with cutoff frequency of 3db at 1000Hz and down 10db at 350Hz. The sampling Frequency is 5000Hz.

(OR)

b. Design a digital chebyshev filter using Bilinear transformation and assume sampling period T=1 sec.

$0.8 \le |H(e^{j\omega})| \le 1$ for $0 \le \omega \le 0.2\pi$

$|H(e^{j\omega})| \le 0.2$ for $0.6\pi \le \omega \le \pi$

14. a. Design of band pass filter of length 7 is required. It is to have lower and upper cutoff frequencies of 3kHz respectively and is intended to be used with a sampling frequency 24kHz. Determine the filter coefficients using hamming window consider the filter to be causal.

(OR)

b. i) Build the cascade realization of $H(z) = (1+5/2z^{-1}+2z^{-2}+2z^{-3})$. (6)

ii) Obtain linear phase realization for the system function given

$H(z) = 1/2 + 1/3z^{-1}+z^{-2}+1/4z^{-3}+z^{-4}+1/3z^{-5}+1/2z^{-6}\}.$ (7)

15. a. Explain the architecture of TMS320C54x with neat diagram.

(OR)

b. i) Explain about different stages of pipelining and specify its importance. (8)

ii) Compare the features of Von Neumann and Harvard architectures. (5)

PART C (1x15=15 Marks)

16. a. Determine the coefficients of a linear phase FIR filter of length N = 15 has a symmetric unit sample response and a frequency response that satisfies the conditions.

$H[2\pi k/15] = 1$ for $k = 0,1,2,3$

0 for $k = 4, 5, 6, 7$

(OR)

b. Construct a FIR filter using Hanning window for a desired frequency response $Hd(e^{j\omega}) = e^{-j3\omega}$ for $-\pi/4 \le \omega \le \pi/4$. The order of the filter is N=7. Find H (z).

*****