CODE NO: 07A6EC01





[8+8]

[16]

Max. Marks: 80

III B.TECH - II SEMESTER EXAMINATIONS, APRIL/MAY, 2011 DIGITAL SIGNAL PROCESSING (COMMON TO EEE, ECE, EIE, ETM, ICE)

Time: 3hours

Answer any FIVE questions All Questions Carry Equal Marks

- 1.a) Define an LTI System and show that the output of an LTI system is given by the convolution of Input sequence and impulse response.
 - b) Prove that the system defined by the following difference equation is an LTI system y(n) = x(n+1)-3x(n)+x(n-1); $n \ge 0$. [8+8]
- 2.a) Define DFT and IDFT. State any Four properties of DFT.
- b) Find 8-Point DFT of the given time domain sequence $x(n) = \{1, 2, 3, 4\}$. [8+8]
- 3.a) Derive the expressions for computing the FFT using DIT algorithm and hence draw the standard butterfly structure.
 - b) Compare the computational complexity of FFT and DFT.
- 4. Discuss and draw various IIR realization structures like Direct form I, Direct form-II, Parallel and cascade forms for the difference equation given by y(n) = -3/8 Y(n-1) + 3/32 y(n-2) + 1/64 y(n-3) + x(n) + 3 x(n-1) + 2 x(n-2).
- 5.a) Compare Butterworth and Chebyshev approximation techniques.
- b) Design a Digital Butterworth LPF using Bilinear transformation technique for the following specifications

$$\begin{array}{c} 0.707 \leq \left| \begin{array}{c} H(w) \right| \leq 1 \\ | \begin{array}{c} H(w) \right| \leq 0.08 \end{array}; \\ 0.4 \ \pi \leq w \leq \pi \end{array}$$
[8+8]

6.a) Compare FIR and IIR filters

- b) Design an FIR Digital High pass filter using Hamming window whose cut off freq is 1.2 rad/s and length of window N=9. [8+8]
- 7.a) Define Multirate systems and Sampling rate conversion
- b) Discuss the process of n Decimation by a factor D and explain how the aliasing effect can be eliminated. [8+8]
- 8. Discuss various Modified Bus structures of Programmable DSP Processors.[16]

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[8+8]

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Time: 3hours

Answer any FIVE questions All Questions Carry Equal Marks

- 1.a) Write short notes on classification of systems.
- b) Derive BIBO stability criteria to achieve stability of a system. [8+8]
- 2.a) Define DFS. State any Four properties of DFS.
- b) Find the IDFT of the given sequence $x(K) = \{2, 2-3j, 2+3j, -2\}$. [8+8]
- 3.a) Find X(K) of the given sequence $x(n) = \{1,2,3,4,4,3,2,1\}$ using DIT- FFT algorithm.
 - b) Compare the computational complexity of FFT and DFT.
- 4. What are the various basic building blocks in realization of Digital Systems and hence discuss transposed form realization structures.
- 5.a) Compare Impulse Invariant and Bilinear transformation techniques.
 - b) Compute the poles of an Analog Chebyshev filter TF that satisfies the Constraints $0.707 \le |H(j\Omega)| \le 1$; $0 \le \Omega \le 2$ $|H(j\Omega)| \le 0.1$; $\Omega \ge 4$

and determine $H_a(s)$ and hence obtain H(z) using Bilinear transformation. [16]

- 6.a) Derive the conditions to achieve Linear Phase characteristics of FIR filters
- b) Design an FIR Digital Low pass filter using Hanning window whose cut off freq is 2 rad/s and length of window N=9. [8+8]
- 7.a) Discuss the implementation of Polyphase filters for Interpolators with an example
 b) Discuss the sampling rate conversion by a factor I/D with the help of a Neat block Diagram. [8+8]
- 8. Write short notes on:
 a) VLIW Architecture of Programmable Digital Signal Processors
 b) Multiplier and Multiplier Accumulator [8+8]

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[8+8]

Max. Marks: 80

III B.TECH - II SEMESTER EXAMINATIONS, APRIL/MAY, 2011 DIGITAL SIGNAL PROCESSING (COMMON TO EEE, ECE, EIE, ETM, ICE)

Time: 3hours

Diagram.

Answer any FIVE questions All Questions Carry Equal Marks

1.a) Discuss various discrete time sequences. Give the Basic block diagram of Digital Signal Processor. b) [8+8] Define DFS. State any Four properties of DFS. 2.a) b) Find the IDFT of the given sequence $x(K) = \{2, 2-3j, 2+3j, -2\}$. [8+8] 3.a) Find IFFT of the given $X(K) = \{1, 2, 3, 4, 4, 3, 2, 1\}$ using DIF algorithm b) Bring out the relationship between DFT and Z-transform. [8+8] 4.a) Define Z-Transform and List out its properties. Discuss Direct form, Cascade and Linear phase realization structures of FIR b) filters. [8+8] 5.a) Discuss digital and analog frequency transformation techniques. b) Discuss IIR filter design using Bilinear transformation and hence discuss frequency warping effect. [8+8] 6.a) Compare various windowing functions. Design an FIR Digital Low pass filter using rectangular window whose cut off b) freq is 2 rad/s and length of window N=9. [8+8] Define Interpolation and Decimation. List out the advantages of Sampling rate 7.a) conversion. Discuss the sampling rate conversion by a factor I with the help of a Neat block b)

- 8.a) Discuss Various Addressing modes of Programmable Digital Signal Processors.
- B.a) Discuss Various Addressing modes of Programmable Digital Signal Processors.
 b) Give the Internal Architecture of TMS320C5X 16 bit fixed point processor.[8+8]

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Max. Marks: 80

III B.TECH - II SEMESTER EXAMINATIONS, APRIL/MAY, 2011 DIGITAL SIGNAL PROCESSING (COMMON TO EEE, ECE, EIE, ETM, ICE)

Time: 3hours

CODE NO: 07A6EC01

Answer any FIVE questions All Questions Carry Equal Marks

- 1.a) Define Linearity, Time Invariant, Stability and Causality.
- b) The discrete time system is represented by the following difference equations in which x(n) is input and y(n) is output. $Y(n) = 3y^2(n-1)-nx(n)+4x(n-1)-2x(n-1)$.

[8+8]

- 2.a) Define Convolution. Compare Linear and Circular Convolution techniques.
 b) Find the Linear convolution of the given two sequences x(n)={1,2} and h(n) ={1,2,3} using DFT and IDFT. [8+8]
 3.a) Develop DIT-FFT algorithm and draw signal flow graphs for decomposing the DFT for N=6 by considering the factors for N = 6 = 2.3.
 b) Bring out the relationship between DFT and Z-transform. [8+8]
 4.a) Discuss transposed form structures with an example.
- b) Discuss Direct form, Cascade realization structures of FIR filters. [8+8]
- 5.a) Discuss digital and analog frequency transformation techniques.
- b) Discuss IIR filter design using Impulse Invariant transformation and list out its advantages and Limitations. [8+8]
- 6.a) Compare various windowing functions
- b) Design an FIR Digital Band pass filter using rectangular window whose upper and lower cut off freq.'s are 1 & 2 rad/s and length of window N = 9. [8+8]
- 7.a) Define Interpolation and Decimation.
- b) Discuss the sampling rate conversion by a factor I/D with the help of a Neat block Diagram. [8+8]
- 8.a) Write a short notes on On-Chip peripherals of Programmable DSP's.
- b) Give the Internal Architecture of TMS320C5X 16 bit fixed point processor. [8+8]

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