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2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS
DIGITAL SIGNAL PROCESSING
(BIO -MEDICAL ENGINEERING AND ELECTRONICS & COMPUTER ENGINEERING)

NOVEMBER 2005

TIME – 3 HOUR
MARK – 80

Answer any FIVE Questions
All Questions carry equal marks

1. *(a) Consider a LSI system with unit sample response h(n)n = nu(n) where is real and 0 < < 1 . If the input is x(n) = n u(n), 0 < | | < 1 ,determine the the output f(n) in the form y(n) = (k1 n + k2nu(n) by explicitly evaluating the convolution sum.*

(b) Define causality and stability of LSI system and state the conditions for st ability. [12+4]

2. *(a) Prove that the convolution in time domain leads to multiplication in frequency domain for discrete time signals*

(b) The out put y(n) for a linear shit invariant system, with the input x(n) is given by Y(n) = x(n)-2x(n-1)+x(n-2) Compute and sketch the magnitude and phase response of the system |w| ▯ ▯ [10+6]

3. *(a) Define DFT. Guide tow properties of DFT.*
(b) Discuss the effects of truncating a sequence x(n) of infinite duration.
(c) Compute the DFT of X(n) = {-1, 0,-1} with T = 0.5. Plot the DFT sequence suggest a method for improving frequency resolution. [4+4+8]

4. *(a) Implement the Decimation in frequency FFT algorithm of N-point DFT where N-8. Also explain the steps involved in this algorithm.*
(b) Compute the FFT for the sequence x(n) = { 1, 1, 1, 1, 1, 1, 1, 1 } [8+8]

5. *(a) Explain how the analysis of discrete time invariant system can be obtained using convolution properties of Z transform.*

(b) Determine the impulse response of the system described by the difference equation y(n)-3y(n-1)-4y(n-2)=x(n)+2x(n-1) using Z transform. [8+8]

6. *(a) Compare the Digital Butterworth and Chebyshev filters.*
(b) Explain method of constructing Butterworth circle in the Z-plane using Bilin ar transformation method. [8+8]

7. *(a) Compare the performances of rectangular window, hamming window and Keiser windo*

(b) The desired response of a low pass filter is Hd(ej!) = ▯ e-j3!, -3□ ▯ ! ▯ 3□/4 0 , 3□/4 ▯ |!| ▯ ▯ Determine H(ej!) for M=7 using a Hamming window. [9+7]

8. *(a) Explain the structures for realisation of FIR system and draw the direct form structure of the FIR system described by the transfer function H(Z) = 1 + 1 2Z-1 + 3 4Z-2 + 1 4Z-3 + 1 2Z-4 + 1 8Z-5*

(b) Realize the following IIR system by cascade and parallel forms. y(n) + 1 4y(n - 1) – 1 8y(n - 2) = x(n) - 2x(n - 1) + x(n - 2) [8+8]