R09

Code No: C6103, C6503

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I - SEMESTER EXAMINATIONS, APRIL/MAY-2012
ADVANCED DIGITAL SIGNAL PROCESSING
(COMMON TO COMMUNICATION SYSTEMS, WIRELESS AND MOBILE COMMUNICATIONS)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks

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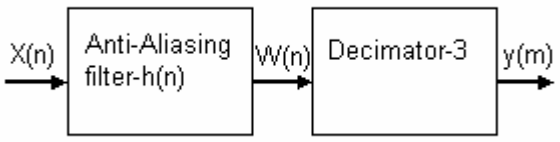
1.a) Explain about the computational requirements (real and Complex multiplications and additions) for the Direct Computation of N-Point DFT of a sequence x(n).
b) Find the 4-Point DFT of the sequence $x(n) = \delta(n)+\delta(n-3)$.

2.a) The 4 point DFT of a sequence x(n) is given by X(k) = {2, 1+j, 0, 1-j}. Find the corresponding periodic signal x(n).
b) State and prove the circular convolution property of DFT.

3.a) Justify that when the unit sample response of a discrete LTI system of duration "N"(even) is symmetric, the phase response of the system is a linear function of frequency.
b) Compute x(n) by using Decimation in Frequency IFFT algorithm, if the corresponding DFTR is x(k) = [7,01,3,1}.

4. Design a low pass Butterworth filter using Bilinear Transformation to satisfy the following Constraints: Pass band = 0.162 rad.; stop band = 1.63rad; pass band ripple = 3dB; stop band attenuation = 30dB; sampling frequency = 8KHz.

5. A one stage decimator is characterized as: Decimation factor = 3; Anti aliasing filter coefficients: h(0) = h(4) = -0.06; h(1) = h(3) = 0.3; h(2) = 0.62. The input for the system is x(n) = {6,-2,-3,8,6,4,-2}. Find w(n) and y(m) for the system shown as below.



6.a) Find the mean and Autocorrelation of the sequence x(n) = w(n)-2w(n-1)+w(n-2), where w(n) is a white noise process with variance σ^2.
b) Distinguish between AR, MA, and ARMA processes.

7.a) The analog input signal for a B-bit ADC has an rms value of 'σ' volts. The input range of ADC is '±3σ' volts. Find the expression for Signal to Quantization Noise ratio in dB for the converter.
b) Explain various data types in which a number is stored in fixed pint data format.

8.a) Explain about a prediction error filter.
b) State and prove the properties of Auto correlation function of a WSS random process.

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