Code No: RR320403 **RR**

III B.Tech II Semester(RR) Supplementary Examinations, May 2010
DIGITAL SIGNAL PROCESSING
(Common Electronics & Communication Engineering, Electronics & Instrumentation Engineering, Electronics & Control Engineering and Instrumentation & Control Engineering)
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find the impulse response for the causal system y(n)-y(n-1) = x(n)+x(n-1)
   (b) Find the response of the above system to inputs x(n) = u(n) and $x(n) = 2^{-n}u(n)$. Test its stability.

   [6+10]

2. Explain the geometrical construction method to determine magnitude and phase response of second order digital systems. [16]

3. (a) What is " padding with Zeros " with an example, Explain the effect of padding a sequence of length N with L Zeros or frequency resolution.
   (b) Compute the DFT of the three point sequence $x(n) = \{2, 1, 2\}$. Using the same sequence, compute the 6 point DFT and compare the two DFTs. [8+8]

4. (a) Let x(n) be a real valued sequence with N-points and Let X(K) represent its DFT , with real and imaginary parts denoted by $X_R(K)$ and $X_1(K)$ respectively. So that X(K) = $X_R(K) + JX_1(K)$. Now show that if x(n) is real, $X_R(K)$ is even and $X_1(K)$ is odd.
   (b) Compute the FFT of the sequence x(n) = { 1, 0, 0, 0, 0, 0, 0, 0 } [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. Determine the system function H(Z) of the lowest order Chebyshev digital filter that meets the following specifications.
   (a) 1 db ripple in the passband $0 \leq |W| \leq 0.3\pi$
   (b) At least 60 db attenuation in the stopband $0.35\pi \leq |W| \leq \pi$. Use the bilinear transformation. [16]

7. (a) Design a low pass filter using rectangular window by taking samples of $\omega(n)$ and with a cut-off frequency of 1.2 radians/sec.
   (b) Compare the various window functions. [8+8]

8. (a) Explain the different structures for realisation of IIR system. and explain how conversion can be made from direct form I structure to direct form II structure.
   (b) Realize the given system in cascade and parallel form
   H(Z) = $\frac{1+\frac{1}{2}Z^{-1}}{\left[1-Z^{-1}+\frac{1}{4}Z^{-2}\right]\left[1-Z^{-1}+\frac{1}{2}Z^{-2}\right]}$ [8+8]

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