Code No: NR311102 **NR**

III B.Tech I Semester Supplementary Examinations, November 2006
DIGITAL SIGNAL PROCESSING
(Common to Bio-Medical Engineering and Electronics & Computer Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. By explicitly evaluating the convolution sum, evaluate the convolution y(n)=(n)*h(n) of the sequences
$h(n) = \begin{cases} \alpha^n & 0 \le n < N \\ 0 & elsewhere \end{cases}$
$X(n) = \begin{cases} \beta^{n-n0}, & n_0 \le n \\ 0 \quad , & n \le n_0 \end{cases}$ [16]

2. (a) A discrete system is given by the following difference equation:
y(n)-5y(n-1) = x(n) + 4x(n-1)
where x(n) is the input and y(n) is the out put. Find the impulse response. Determine its magnitude and phase response as a function of frequency.
(b) Show that the frequency response of a discrete system is a periodic function of frequency. [8+8]

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) Explain the inverse FFT algorithm to compute inverse DFT of a N=8. Draw the flow graph for the same.
(b) Compute the FFT for the sequence { 1, 0, 0, 0, 0, 0, 0, 0 } [8+8]

5. (a) How will you test the stability of a digital filter? Discuss the stability of the system described by $H(Z) = \frac{Z^{-1}}{1-Z^{-1}-Z^{-2}}$
(b) Determine the frequency, magnitude and phase responses and time delay for the system
$y(n) + \frac{1}{4}y(n-1) = x(n) - x(n-1)$ [8+8]

6. (a) What is warping effect? Discuss influence of warping effect on amplitude response and phase response of a derived digital filter from a corresponding analog filter.
(b) Discuss impulse invariance method. [8+8]

7. Design a band pass filter to pass frequencies in the range 1-2 radians/second using hanning window N=5. Draw the filter structure and plot its spectrum. [16]

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
$H(Z) = 1 + \frac{1}{2}Z^{-1} + \frac{3}{4}Z^{-2} + \frac{1}{4}Z^{-3} + \frac{1}{2}Z^{-4} + \frac{1}{8}Z^{-5}$

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

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