R09

Code No: C9301

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I - Semester Examinations, March/April 2011
ADVANCED DIGITAL SIGNAL PROCESSING
(SYSTEMS AND SIGNAL PROCESSING)

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

Answer any five questions
All questions carry equal marks

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1. Compare the following:
   a) Butterworth and Chebyshev Approximations
   b) FIR and IIR Filter designs. [12]

2.a) Define sampling rate conversion. Explain the Process of Interpolation by a factor I.
   b) The bandwidth of a sequence x(n) is 3.4 KHz and it sampling rate is to be reduced, by decimation from 240 KHz to 8KHz. Assume that an Optimal FIR filter is to be used, with an overall pass-band ripple 0.05 and stop-band ripple 0.01. Design an efficient Two Stage Decimator. [12]

3.a) Discuss in brief about Welch method of Power Spectrum Estimation.
   b) Determine the frequency resolution of Bartlett, Welch, and Blackman-Tukey methods of power spectrum estimates for a quality factor Q =10. Assume that overlap in Welch method is 50% and length of sample sequence is 1000. [12]

4.a) Derive the relation between Auto-Correlation and Model Parameters of ARMA and from that derive for AR and MA models.
   b) Discuss in brief about Burg Method and List out the Advantages and Disadvantages of it. [12]

5.a) Discuss the effect of ADC Quantization noise on Signal Quality.
   b) What are Limit Cycles and discuss various types of Limit Cycles in brief.
   c) Discuss in brief about Co-efficient word length requirements for stability and desired frequency response. [12]

6.a) Compare and Contrast Non-Parametric and parametric methods of power spectral density.
   b) Addition over flow errors and their remedies. [12]

7. Discuss how to solve normal equations using schur algorithm and also show that it requires computations of order O(p) compared to Levinson algorithm which requires computations of order $O(p^2)$. [12]

8.a) What is the use of DFT in power spectrum estimation
   b) Define Periodo-gram and prove that it is a poor estimate of power spectrum estimation.
   c) Compute the auto correlation and power spectral density for the signal $x(t) = k \cos(2\pi fct+\varphi)$.
   Where K and fc are constants and φ is a random variable, which is uniformly, distribute over the interval $(-\pi, \pi)$. [12]

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