JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I Semester Examinations, April 2011
ADVANCED DIGITAL SIGNAL PROCESSING
(DIGITAL ELECTRONICS & COMMUNICATION SYSTEMS)

Time: 3hours   Max. Marks: 60

Answer any five questions
All questions carry equal marks
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1. a) Explain clearly the importance of DFT in signal processing and hence bring out the procedure for implementation of DFT using FFT.
   b) Discuss clearly the role of sampling and hence bring out the necessity for multi rate sampling in DSP.   [6+6]

2. a) Distinguish between Decimation and Interpolation and explain clearly to implement sample rate conversion by a rational factor I/D illustrating all the steps in detail.
   b) Bring out the role of low pass filter to be used and derive the relation for optimum cut off frequency of it in case of conversion by (I/D). Also, give the appropriate location in the implementation diagram.   [6+6]

3. a) what are the issues involved in pavers spectral estimation of finite duration data using Periodogram and modified Periodogram methods.
   b) Explain clearly the Barlett method of implementation for power spectral estimation and compare it Blackman-Tukey procedure.   [6+6]

4. a) Explain the modeling of finite data and compare different types of model and their applications.
   b) Discuss the relation between autocorrelation and model parameters incase of AR model and explain clearly Burg method.   [6+6]

5. a) Explain the MA model for power spectral estimation and discuss the procedure for estimating the model parameter incase of MA(q) model.
   b) Explain the power spectral estimation using ARMA model and bring out its limitations and advantages.   [6+6]

6. a) Explain clearly about forward prediction and backward prediction and obtain a relation between forward prediction coefficients and backward prediction coefficients of a system given by $y(n) = \sum_{k=0}^{N} a_k x(n-k)$.
   b) What is normal equation? Derive normal equation incase of one step prediction and provide solution for it.   [6+6]

7. a) Explain clearly about quantization in ADC and the effect of it on data length. Relate length to noise power spectral density.
   b) Derive expression for truncation error in case of fixed point representation using:"
       i) Sign-magnitude.   ii) 1's Compliment and   iii) 2's Compliment.   [6+6]

8.   Write short notes on:
     a)   Properties of linear prediction filters.
     b)   Finite word length effect in IIR filters.   [6+6]

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