

**Code No: C4502****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****M.Tech I Semester Examinations, March/April 2011****ADVANCED DIGITAL SIGNAL PROCESSING****(SYSTEM & SIGNAL PROCESSING)****Time: 3hours****Max. Marks: 60**

**Answer any five questions**  
**All questions carry equal marks**

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1. a) Explain clearly the need for sample rate conversion and discuss about different techniques of sample rate conversion.  
b) Explain clearly the procedure for decimation by a factor D and bring out the considerations for selection of LPF. Impulse response  $\ell(n)$ . Show all the steps involved. [12]
2. a) What do you understand by the term Polyphase structures for sample rate conversion and discuss the steps for efficient implementation of sampling rate conversion by a factor (I/D).  
b) Discuss the implementation of multistage sections for decimation of 4KHZ audio signal sampled at 8 KHZ. Given frequency components below 80HZ are to be isolated. Using a filter with pass bound  $0 \leq F \leq 75\text{HZ}$  and transmission band  $75 \leq F \leq 80\text{Hz}$ . The attenuation is pass bound  $\delta_1 \leq 10^{-2}$  and in stop band is  $\delta_2 \leq 10^{-4}$ . Design a multistage F/R filter. [12]
3. a) Explain clearly the power spectral estimation of finite duration signals using periodogram techniques bring out the limiting of it.  
b) Discuss the implementation of Bartlett Welch methods for improvement of power spectral estimation and compare them. [12]
4. a) Discuss the principle of parametric modeling and hence bring out different models used for power spectral estimation and obtain the relation between model parameters and Autocorrelation of data series.  
b) Obtain the simplified relation between the parameters and Autocorrelation parameters of AR model of order N and explain the power spectral estimation using this model. [12]
5. a) Define Bragg Algorithm and Explain the implementation of it and bring out the advantages and disadvantages of it.  
b) Discuss importance of Model order selection and explain different methods available. [12]
6. a) Explain the advantages of Lattice structures for FIR implementation and hence obtain the relation between Difference equation coefficients representing  $N^{\text{th}}$  order FIR system and Lattice parameter.  
b) Determine the Lattice structure parameters  $\{K_m\}$  per. Implementation of FIR filter with system function.  $H(z) = 1 + 2z^{-1} + z^{-2}$ . [12]

- 7.a) Explain clearly the effect of Finite word representation in DSP and hence distinguish clearly between truncation and Round off errors.  
b) Derive expression for Round off and truncation errors in case of Fixed point representation and Floating point representation. [12]
8. Write short notes on  
a) Sub band coding and QMF filter in multirate signal processing.  
b) Lattice implementation of IIR filters. [12]

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