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18ECS12

First Semester M.Tech. Degree Examination, Dec.2018/Jan.2019 Advanced Digital Signal Processing

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Derive an expression for spectrum of decimator output sequence. (10 Marks)
 b. Explain the implementation of sampling rate conversion using poly phase structures. (10 Marks)

OR

- 2 a. Explain two channel QMF bank with neat block diagram and equations. (10 Marks)
 b. The polyphase matrix for a Three channel QMF bank is

$$p(z^3) = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 3 & 1 \\ 1 & 2 & 1 \end{bmatrix}$$

Draw the analysis and synthesis filters in QMF bank. (10 Marks)

Module-2

- 3 a. Define Random process. Explain
 i) Ergodic process
 ii) Autocorrelation function
 iii) Power density spectrum of a random process. (10 Marks)
 b. Explain forward prediction. Derive an expression for Minimum Mean Square Error (MMSE) of forward prediction process. (10 Marks)

OR

- 4 a. Obtain the solution for normal equations for prediction coefficients and MMSE using Levinson – Durbin algorithm. (10 Marks)
 b. List the properties of linear prediction error filters. (10 Marks)

Module-3

- 5 a. Explain with a block diagram adaptive channel equalizer to reduce the distortion in transmission channel. (10 Marks)
 b. Explain linear predictive coding to encode speech signal. (10 Marks)

OR

- 6 a. Explain LMS algorithm based on minimum mean squared error criterion. (10 Marks)
 b. Explain RLS algorithm and mention its advantages over LMS algorithm. (10 Marks)

Module-4

- 7 a. Explain power spectral estimation using Barlett method. (10 Marks)
 b. Explain Welch method for spectrum estimation. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 8 a. Explain Burg method for AR model parameter estimation. (10 Marks)
b. What are the limitation of Nonparametric methods of power estimation and how they are overcome in parametric methods? (10 Marks)

Module-5

- 9 a. Explain short time Fourier transform and explain how it overcomes the limitations of Fourier transform. (10 Marks)
b. Discuss the applications of wavelet transform. (10 Marks)

OR

- 10 a. Write a note an Daubechies wavelet transform. (10 Marks)
b. Explain Haar wavelet function and scaled Haar wavelet functions. (10 Marks)
