

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE –
RAIGAD -402 103
Summer Semester Examination – May - 2018

Branch: M.Tech (Electronics Engineering)

Sem.:- II

Subject with Subject Code:- Advanced DSP [MTEEC201]

Marks: 60

Date:- 14-05-2018

Time:- 3 Hr.

Instructions:-

1. Solve any five questions.
2. Assume suitable data, if necessary.
3. Figures to right indicate full marks.

Q.No.1 Attempt any TWO of the following (12)

- a.) State various methods for signal modeling. Explain one of those in details.
- b.) Explain operation for Wiener filter and derive an expression for the minimum mean square error.
- c.) Derive the Spectral Factorization of a power spectrum $P_x(e^{j\omega})$.

Q.No. 2 Attempt any TWO of the following (12)

- a.) Compare Auto-correlation and co-variance methods.
- b.) Explain the stochastic ARMA model.
- c.) Any process that can be factored is called as regular process. Justify this statement and describe the properties of regular process.

Q.No. 3 Attempt any TWO of the following (12)

- a.) Derive the expression for Wiener Hoff equations
- b.) Derive the expression for computing Kalman gain.
- c.) Give in details Levinson recursion algorithm for solving Toplitz system of equations.

Q.No. 4 Attempt any TWO of the following (12))

- a.) Explain Newton's steepest descent method.
- b.) Explain Widrow-Hoff LMS Adaptation Algorithm.
- c.) How the adaptive echo-canceller works

Q.No.5 Attempt any TWO of the following

(12)

- Justify the need of interpolation & decimation processes in Multirate DSP.
- Describe Poly-phase realization.
- State and explain the applications of Wavelet Transform for sub-band coding.

Q.No.6 Attempt any TWO of the following

(12)

- If the desired unit sample response is

$$h_d[n] = 2(1/2)^n u[n]$$

Determine the parameters of filter with system function

$$H(Z) = \frac{b_0 + b_1 z^{-1}}{1 + a_1 z^{-1}} \text{ using Pade approximation technique.}$$

- Determine the mean and autocorrelation of the sequence $x[n]$ which is output of an ARMA (1,1) process described by the difference equation $x[n] = 1/2 x[n-1] + w[n] - w[n-1]$, where, $w[n]$ is a white noise with variance σ_w^2

- In the Welch method, calculate the variance of Welch Power Spectrum Estimate with Barlett window, if there is 50% overlap between successive sequences.
