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M.E./M.Tech. Degree Examinations, January 2017

First Semester

COMMUNICATION SYSTEMS

(Common to Applied Electronics)

CU16103 – ADVANCED DIGITAL SIGNAL PROCESSING

(Regulation 2016)

QP Code: 692404

Time: Three hours

Maximum : 100 marks

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

1. What is relationship between autocorrelation function and power spectral density?
2. Write the expression for least square error in signal modeling.
3. What are the two types of Power Spectral Density estimation?
4. Differentiate Periodogram and Modified Periodogram.
5. What is the error criteria for Wiener filter?
6. What is advantage of discrete Kalman filter over Wiener filter?
7. Differentiate steepest descent and LMS algorithm.
8. What is adaptive noise cancellation?
9. Why low pass filter is required before down sampler?
10. What is sub-band coding? Mention its applications.

PART B - (5 X16 = 80 Marks)

11. (a) (i) State and prove Spectral factorization theorem. **(12)**
(ii) Find the PSD at the output of a filter with transfer function **(4)**
 $H(z) = 1/(1-0.25z^{-1})$ with white noise of unit variance as input.

(OR)

- (b) Obtain the expression for Pade's method of signal modeling for **(16)**
approximating a signal $x(n)$ as unit sample response of LSI system having
 p poles and q zeros.

12. (a) (i) Explain in detail about the Periodogram Spectrum Estimation. (12)
(ii) What are the properties of PSD estimation? (4)

(OR)

- (b) Explain Yule –Walker parameter estimation using AR model. (16)

13. (a) Derive Wiener HoPf equations and the minimum mean square error for the FIR Wiener filter. (16)

(OR)

- (b) Briefly explain the estimation of a non stationary process by a Kalman filter. (16)

14. (a) Explain in detail steepest descent algorithm for FIR filter. (16)

(OR)

- (b) Explain the different types of noise cancellation using adaptive filter. (16)

15. (a) With necessary equations and diagrams the operation of decimator by an integer factor used for multirate signal processing. (16)

(OR)

- (b) (i) Explain the concept of polyphase decomposition in implementing multirate systems. (10)

- (ii) Write short notes on sub-band coding. (6)