R09

Code No: D9301

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH II - SEMESTER EXAMINATIONS, APRIL/MAY 2012
ADAPTIVE SIGNAL PROCESSNG
(SYSTEMS AND SIGNAL PROCESSING)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks
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1.a) Give the block diagram of an adaptive system and explain the principle of adaptation in detail. Hence explain the application of the adaptive system for real time analysis.

b) Define Auto correlation Matrix and bring out its importance in signal processing and bring out its properties.

2.a) State Wiener–Holf equation and derive the expression to calculate optimum weights in terms of correlation matrix R_{xx} and cross correlation vector P.

b) Given $R_{xx} = \begin{bmatrix} 1 & 0.5 & 0.25 \\ 0.5 & 1 & 0.5 \\ 0.25 & 0.5 & 1 \end{bmatrix}$ and $P = \begin{bmatrix} 0.5 \\ 0.25 \\ 0.125 \end{bmatrix}$

Evaluate the optimum weights of 3rd order Adaptive Wiener filter. Also obtain the P_{min}.

3.a) Define linear prediction and bring out the relationship between forward and backward linear prediction coefficients.

b) Prove that forward prediction filter is minimum phase and backward prediction filter has maximum phase.

4.a) Explain steepest descent Algorithm and obtain the iterative relations for calculating the tap weights.

b) Explain clearly the method of Gradient search by Newton's method and compare this with steepest descent algorithm.

5.a) Discuss the implementation of LMS algorithm.

b) Explain in brief about the differences between LMS adaptation algorithm and steepest gradient algorithm.

6. Explain about
a) Adaptive Echo Cancellation b) Adaptive beam forming

7. Explain the drawbacks of Wiener filter and explain how these are over come in Kalman filter with the help of a neat block diagram. Discuss the role of each block with necessary equations.

8. Explain the following
a) Divergence Phenomenon b) Square root filtering

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