Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **M.TECH**

EEPE205

2nd Semester Back Examination 2016-17

ADVANCED DIGITAL SIGNAL PROCESSING

BRANCH(S): ELECTRI & ELECTRO ENGG (POWER SYSTEM ENGG), ELECTRICAL POWER SYSTEM, POWER ELECTRO, POWER ELECTRO & DRIVES, POWER ELECTRO AND ELECTRICAL DRIVES, POWER SYSTEM ENGG, POWER SYSTEMS

Time: 3 Hours

Max marks: 70

Q.CODE:Z341

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Q1 Answer the following questions: (2 x 10)

a) What is adaptive in adaptive filter? How is it done?

b) Show that the correlation matrix of stochastic discrete time process is Hermitian.

c) With sketch explain what is Adaptive Linear combiner?

d) Adaptive signals are nonlinear justify?

e) Define gradient mean square error. What is the physical significance?

f) What do you mean by Learning curve?

g) What are the advantages of RLS algorithm over the LMS algorithm?

h) What are the different types of estimation?

i) What is Matrix inversion lemma?

j) Draw the structure of an adaptive noise canceller, Discuss the significance of each signal.

Q2 a) Derive Wiener-Hopf equation for a filtering problem. (5)

b) Derive mean square error in canonical form for wiener filter. (5)

Q3 a) Explain Backward linear prediction. (5)

b) Write the relationship between Forward and Backward Predictors. (5)

Q4 Consider a Wiener filtering problem characterized as follows: (10)

The correlation matrix R of the tap-input vector u(n) is $R = \begin{bmatrix} 1 & 0.5 \\ 0.5 & 1 \end{bmatrix}$

The cross-correlation vector between the tap-input vector u(n) and the desired response d(n) is $P = \begin{bmatrix} 0.5 \\ 0.25 \end{bmatrix}$

a. Evaluate the tap Weights of Wiener filter.
b. What is the minimum mean square error produced by this Wiener filter?
c. Formulate a representation of the Wiener filter in terms of the eigenvalues of matrix R and associated eigenvectors.

Q5 a) Explain stability of Steepest-Descent algorithm. (5)

b) Summarize the LMS Algorithm. (5)

Q6 a) Explain Normalized LMS filter as the solution to a constrained optimization problem. (5)

b) Explain the exponentially weighted RLS algorithm. (5)

Q7 a) Discuss recursive minimum mean square estimation for scalar random variables. (5)

b) What is Block LMS algorithm and write its convergence properties? (5)

Q8 **Write short note on any two** (5 x 2)

a) The Performance function
b) Adaptive Beam forming.
c) Limitations of Steepest-Descent Algorithm.
d) Innovation process in Kalman filtering