Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – WINTER 2012

Subject code: 730405 **Date: 26/12/2012**

Subject Name: Major Elective IV – Adaptive Signal Processing

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain three basic information-processing operations and Linear optimum filters. Also Compare optimum filter with adaptive fitter.	**07**
	(b)	What is discrete time stochastic process and explain wide-sense stationary process and prove that wide-sense stationary process is non-singular.	**07**
Q.2	**(a)**	State and derive the principal of Wold Decomposition.	**07**
	(b)	Explain Autoregressive-Moving-Average Models.	**07**
		OR	
	(b)	Define power spectral density and prove that power spectral density of a stationary discrete time stochastic process is real.	**07**
Q.3	**(a)**	Derive Winner-hopf equation for a filtering problem.	**07**
	(b)	Discuss the application of Levinson-Durbin algorithm for linear prediction	**07**
		OR	
Q.3	**(a)**	State and describe the mathematical formulation of the steepest-descent algorithm for Wiener filter.	**07**
	(b)	Explain and derive relations between Backward and Forward Predictors.	**07**
Q.4	**(a)**	Derive the Misadjustment parameter for LMS filter.	**07**
	(b)	Explain and derive the any two properties of prediction-error filters.	**07**
		OR	
Q.4	**(a)**	Explain backward liner prediction	**07**
Q.4	**(b)**	Derive the necessary and sufficient condition for stability of steepest-descent algorithm.	**07**
Q.5	**(a)**	Compare the LMS algorithm with the RLS Algorithm.	**07**
	(b)	Explain NLMS algorithm	**07**
		OR	
Q.5	**(a)**	Explain Instantaneous Frequency Measurement with the help of LMS Algorithm.	**07**
	(b)	Explain the exponentially weighted Recursive Least-Squares Algorithms.	**07**

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