Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2720505 **Date: 27/05/2016**

Subject Name: Adaptive Signal Processing

Time:10:30 am to 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)**	Define correlation matrix of random process in context of problem of prediction. Prove any three important properties of it.	**07**
	(b)	Derive the canonical form of the Mean Square Error cost function for linear filtering problem.	**07**
Q.2	**(a)**	Selection criteria for adaptive filtering algorithm plays important role in design. Explain in detail.	**07**
	(b)	Deduce Fast Block LMS Algorithm, also explain its advantages.	**07**
		OR	
	(b)	Define Misadjustment. Derive Misadjustment parameter for LMS algorithm	**07**
Q.3	**(a)**	Derive weight update equation of LMS algorithm from steepest descent algorithm	**07**
	(b)	Describe AR Lattice and ARMA Lattice Ladder Filters, explain its relative advantages compared to other type of filters.	**07**
		OR	
Q.3	**(a)**	How Recursive Least Square algorithm improves over Least square algorithm? Explain concept of a priori and posteriori errors in this context.	**07**
	(b)	Formulate forward prediction problem and derive prediction error filter coefficients.	**07**
Q.4	**(a)**	Explain advantages of using Kalman filter and justify; how state space model concept helps improving over other adaptive algorithms.	**07**
	(b)	Compare the LMS algorithm with the steepest descent algorithm. Explain clearly merits over each other.	**07**
		OR	
Q.4	**(a)**	Define innovation, in context of kalman filtering. List and explain all properties of innovation.	**07**
	(b)	Formulate backward prediction problem and derive prediction error filter coefficients.	**07**
Q.5	**(a)**	Explain, how problem of multipath for troposcatter Signals and digital signal can be corrected using ASP.	**07**
	(b)	Adaptive signal processing algorithm can help to remove hums of an ECG signal, Justify in detail.	**07**
		OR	
Q.5	**(a)**	What are advantages of Frequency-Domain and Sub band Adaptive Filters over time domain adaptive filters? Justify.	**07**
	(b)	One can enhance signal Reception Quality using an Array of Antenna and adaptive signal processing. Justify in detail.	**07**