Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
ME – SEMESTER I (OLD) – • EXAMINATION – SUMMER 2016

Subject Code: 714101N   **Date:16/05/2016**
Subject Name: Mathematical Methods in Signal Processing
Time:02:30 pm to 05:00 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)**	What is the significance of HMM model?	**07**
	(b)	Explain any two properties of Fourier transform.	**07**
Q.2	**(a)**	Explain any two properties of z- transform.	**07**
	(b)	Explain two applications of ML estimation.	**07**

OR

	(b)	Explain significance of Auto correlation and cross correlation function.	**07**
Q.3	**(a)**	Explain about binary hypothesis testing	**07**
	(b)	Explain about stochastic AR and MA models.	**07**

OR

Q.3	**(a)**	Explain sampling process with suitable example. Discuss about anti aliasing filter.	**07**
	(b)	If λ is an eigen value of a nonsingular matrix A , show that A/λ is an eigen value of *adj A*.	**07**
Q.4	**(a)**	Let $f : X \rightarrow R$ be an arbitrary function defined on a set X. Show that $d(x, y) = f(x) - f(y)$ is a Pseudometric.	**07**
	(b)	Compute transpose, inverse and rank of the matrix A.	**07**

$$\begin{bmatrix} 3 & -2 & 4 \\ 2 & -2 & 4 \\ 0 & -1 & 1 \end{bmatrix}$$

OR

Q.4	**(a)**	Describe fundamentals of LFSR and its any one application.	**07**
	(b)	Describe LMS adaptive filtering	**07**
Q.5	**(a)**	Describe : Bayes estimate theory	**07**
	(b)	Mention the properties of Matrix inverses.	**07**

OR

Q.5	**(a)**	Describe in brief: How mathematical modeling is used for signal processing.	**07**
	(b)	Describe : Gaussian Random variable and random process	**07**

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