Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– I (New course)• REMEDIAL EXAMINATION – SUMMER 2015

Subject Code: 2713109 **Date:14/05/2015**

Subject Name: Biomedical Signal Processing

Time: 10:30 am to 1:00 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 the correspondences, correlation, and inter-relationships present between concurrent signals related to a common underlying physiological system or process.	**07**
	(b)	Write a brief note on random noise, structured noise and physiological interference present in our interest signal.	**07**
Q.2	**(a)**	Explain derivative-based methods for QRS detection with necessary equations.	**07**
	(b)	Write a short note on Morphological analysis of ECG wave including diseases conditions.	**07**
		OR	
	(b)	Explain steps of the Pan-Tompkins algorithm for QRS detection with necessary equations.	**07**
Q.3	**(a)**	What is the need of synchronized averaging? Derive necessary equation to prove that synchronized averaging improve SNR.	**07**
	(b)	Explain technical aspects of an optimal filter to remove noise from a signal, given that the signal and noise processes are independent, stationary, random processes.	**07**
		OR	
Q.3	**(a)**	Explain moving average filter with their signal flow graph.	**07**
	(b)	How adaptive filter is different than other filters? Explain adaptive noise canceller model.	**07**
Q.4	**(a)**	Explain indicators used to measures waveform complexity or activity that may be used to analyze the extent of variability.	**07**
	(b)	Discuss the concept of curve fitting to biomedical database.	**07**
		OR	
Q.4	**(a)**	Write a short note on all pole modeling.	**07**
	(b)	1) Suppose you have given a filter with a zero at 30 degree on the unit circle. You are asked to use this filter as a notch filter to remove 50 Hz noise. How will you do this? Can you use the same filter as a notch filter, rejecting different frequencies? 2) A digital filter has the output sequence {1,2,-3,0,0,0é } when its input is the unit impulse. If the input is a unit step, what is the output sequence?	**07**
Q.5	**(a)**	Explain supervised Pattern classification concept with necessary schematic.	**07**

	(b)	Obtain the coefficients of an FIR low pass filter to meet the following specifications using Blackman Window method Stop Band Attenuation >50 dB Pass Band edge frequency3.4.KHz Transition width 0.6 KHz Sampling Frequency 8 KHz	**07**
		OR	
Q.5	**(a)**	Explain unsupervised Pattern classification concept with necessary schematic.	**07**
	(b)	Write a short note on Logistic Regression Analysis.	**07**

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