Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – SUMMER 2013

Subject Code: 160305 **Date: 30-05-2013**

Subject Name: Biomedical 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)**	List different types of signals and with example explain time scaling and folding of signal.	**07**
	(b)	Differentiate: time variant Vs. time invariant system and causal Vs. non-causal system.	**07**
Q.2	**(a)**	Explain frequency response of rational systems. What is log magnitude response?	**07**
	(b)	Derive transpose form of basic structures of FIR systems.	**07**
		OR	
	(b)	Explain minimum phase system.	**07**
Q.3	**(a)**	Differentiate between type I, II, III and IV FIR linear phase system.	**07**
	(b)	List the various forms of realizations of IIR systems.	**07**
		OR	
Q.3	**(a)**	List the commonly used windowing functions for FIR filter design. Explain Hamming window function.	**07**
	(b)	An ideal discrete-time lowpass filter with cutoff frequency $\omega_c=2\pi/5$ was designed using impulse invariance from an ideal continuous-time lowpass filter with cutoff frequency $\Omega_c=2\pi(4000)$ *rad/s.* what was the value of T? Is this value unique? If not, find another value of T consistent with the information given.	**07**
Q.4	**(a)**	List the properties of DFT. Explain any two in detail.	**07**
	(b)	Two four point sequences $x[n]=\cos\left(\frac{\pi n}{2}\right)$ and $h[n]=2^n$ where $n=0, 1, 2, 3.$, calculate the four point DFT of $X[k]$ and $H[k]$.	**07**
		OR	
Q.4	**(a)**	The Goertzel Algorithm.	**07**
Q.4	**(b)**	Differentiate Decimation-in-time Vs. Decimation-in-frequency FFT algorithms.	**07**
Q.5	**(a)**	What are the desirable features of DSP processors? Compare architectural features of DSP and microprocessors.	**07**
	(b)	What are the applications of DSP processors in biomedical signal analysis?	**07**
		OR	
Q.5	**(a)**	Discuss the application of digital signal processing for fetal heart monitoring.	**07**
	(b)	Explain the procedure for EMG signal processing and analysis.	**07**

****