Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –IIst SEMESTER–EXAMINATION – JULY- 2012

Subject code: 1723101 Date: XX/07/2012

Subject Name: Virtual Biomedical instrumentation System

Time: 10:30 am – 13:00 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)**	Enlist and explain the applications of virtual instrumentation in biomedical engineering with examples.	**07**
	(b)	Discuss the advantages of PC based Data monitoring system.	**07**
Q.2	**(a)**	Briefly classify DAQ VIs and explain any two in detail with appropriate examples.	**07**
	(b)	Draw and explain the flowchart for developing any virtual/real signal acquisition/generation system.	**07**
		OR	
	(b)	What is circular buffer? Explain the use of circular buffer in any biomedical signal acquisition system.	**07**
Q.3	**(a)**	Enlist and explain the categories of analog signal. Discuss the effects of resolution on ADC precision.	**07**
	(b)	Describe the single and multiple channels Single-point analog input system with block diagram.	**07**
		OR	
	(a)	What is signal limit setting? Calculate measurement precision of 12 bit A/D converter for various device voltage ranges and limit setting.	**07**
	(b)	Which parameters should be considered while acquiring multiple analog waveforms having various frequency components ranging from 5Hz to 15KHz?	**07**
Q.4	**(a)**	Explain hardware and software triggering. Give one example of both type of triggering.	**07**
	(b)	Explain the concept of adaptive filtering. What is system identification and noise cancelation?	**07**
		OR	
	(a)	Explain analog and digital triggering. Give one example of both type of triggering.	**07**
	(b)	Give a brief introduction to any one technique of ECG signal data compression.	**07**
Q.5	**(a)**	Draw and explain the block diagram for PCG signal acquisition and classification for heart rate variability.	**07**
	(b)	A biomedical signal acquisition system is acquiring 5000 samples of 10sec signal in LabVIEW. Which information is needed to do FFT analysis of this 1D array of 5000 samples? Justify your answer with mathematical formula.	**07**
		OR	
	(a)	Draw and explain the block diagram for ECG signal acquisition and classification for diagnosis of cardiac disorders.	**07**
	(b)	Write the frequency ranges of below given biological signals and select sampling frequency, number of acquisition channels, input buffer size and device voltage ranges for each signal acquisition system accordingly. 1. Electrocardiogram (ECG) 2. Electromyogram (EMG) 3. Ballistocardiogram (BCG) 4. Speech Signal (Acoustic) 5. Visual Evoked Potential (VEP)	**07**

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