Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: 171006 **Date: 28/12/2012**

Subject Name: Biomedical Instrumentation

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain different lead configuration available for recording an ECG signal. Explain, in brief, different types of ECG recorders.	**07**
	(b)	With neat sketches, describe the *depolarization* and *repolarization* process occurring in human cells.	**07**
Q.2	**(a)**	What is an *electrode?* Draw an equivalent circuit for measuring the biopotentials using two electrodes. Explain *microelectrodes* in brief.	**07**
	(b)	Draw one ECG beat indicating typical amplitude and time values. Explain the physiology behind the development of ECG beat aided with cardiovascular circulation.	**07**
		OR	
	(b)	Draw the diagram that relates *blood pressure* variations with *heart sounds* and ECG waveform. Explain, in brief, *indirect* method of measuring the blood pressure.	**07**
Q.3	**(a)**	Draw the block diagram of an *electrocardiograph* (ECG) machine and explain it in detail.	**07**
	(b)	Explain *magnetic* and *ultrasonic* blood flowmeters with neat sketches.	**07**
		OR	
Q.3	**(a)**	Explain *electroencephalograph (EEG)* and *electromyograph* (EMG) machines with their block diagrams and discuss their applications.	**07**
	(b)	What is *plethysmography?* Explain operating principles of different types of plethysmographs.	**07**
Q.4	**(a)**	What is a *pacemaker?* Explain *competitive* and *non-competitive* types of pacemakers.	**07**
	(b)	Explain the principle of *electronomy, coagulation, fulguration* and *desiccation*. Also explain the surgical diathermy machine.	**07**
		OR	
Q.4	**(a)**	What is *fibrillation?* Explain ac and dc *defibrillators* with neat sketches and waveforms.	**07**
	(b)	Explain the operating principle of *heart lung machine* and discuss its applications.	**07**
Q.5	**(a)**	Explain the principle of radiation. Draw and explain the block diagram of an x-ray machine.	**07**
	(b)	Explain the operating principle of Ultrasound imaging.	**07**
		OR	
Q.5	**(a)**	Discuss the limitations of x-ray imaging. Explain the principle of CT imaging.	**07**
	(b)	Explain the operating principle of positron emission tomography (PET).	**07**

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