Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II(New course) • EXAMINATION (Remedial) – WINTER- 2015

Subject Code: 2725408 **Date: 11/12/2015**

Subject Name: Biomedical Instrumentation and Signal Processing

Time:2:30 pm to 5:00 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)**	With the help of neat figures, explain the process of *depolarization* and *repolarization* that take place in a human cell.	**07**
	(b)	State various types of biomedical signals available in human body. Draw and explain the ECG signal with all the time intervals.	**07**
Q.2	**(a)**	Enlist the types of sensors and transducers for biomedical signal acquisition. Explain temperature and optical transducers.	**07**
	(b)	With necessary figures explain the theory behind the development of electric potential through electrodes. Enlist the types of electrodes used to record various bioelectric signals.	**07**
		OR	
	(b)	Which are the sources of artifacts encountered in biomedical instruments/ signals? Briefly discuss the necessary techniques to remove these artifacts.	**07**
Q.3	**(a)**	Describe the instrumentation used for measuring blood pressure and heart sounds.	**07**
	(b)	What is the necessity of pacemakers and defibrillators? Explain the working principle of defibrillators with necessary figures.	**07**
		OR	
Q.3	**(a)**	Draw and explain the circuit diagram of an ECG machine. Design the same for a gain of 100 and high pass and low pass cut-off frequencies of 0.5 Hz and 40 Hz, respectively.	**07**
	(b)	Describe indirect method of blood pressure measurement. Write a brief note on heart sounds.	**07**
Q.4	**(a)**	Which are the lead configurations used to record the ECG signals? Explain them with the help of neat figures.	**07**
	(b)	What is an EEG signal? Describe various EEG rhythms with their waveforms	**07**

and their clinical importance.

OR

Q.4	**(a)**	Enlist the techniques for removing the *powerline interference* from an ECG signal. Describe any one in detail.	**07**
	(b)	With neat sketches explain the 10-20 EEG recording system. Discuss the applications of EEG recording and measurement.	**07**
Q.5	**(a)**	Explain the block diagram of an EMG machine and write a note on neuro-muscular measurement.	**07**
	(b)	State the importance of QRS complex in ECG signal. Enlist various methods of QRS detection and explain any one in detail.	**07**

OR

Q.5	**(a)**	Explain the working principle of an x-ray. Draw and explain the working of an x-ray machine.	**07**
	(b)	Describe the principle of computed tomography (CT) scanning and state the applications of CT imaging.	**07**

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