Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2161712 **Date: 08/05/2017**

Subject Name: Bio-Potential Instrumentation

Time: 10:30 AM to 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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	What is action potential?	
	2	What is resting potential?	
	3	What is magnitude and frequency of ECG signal?	
	4	What is magnitude and frequency of EEG signal?	
	5	What is dendrite?	
	6	What is neuron?	
	7	Briefly explain EMG.	
	8	What is electrode skin interface?	
	9	How can we reduce electrode skin impedance?	
	10	What is needle electrode? Explain its application.	
	11	Why isolation is required in medical instruments?	
	12	What is leakage current in medical instrument?	
	13	List out various physiological systems of human body.	
	14	What is sodium potassium pump?	
Q.2	**(a)**	Explain various ECG electrodes.	**03**
	(b)	With proper equations explain SNR. Also explain why it is useful for medical instrumentation.	**04**
	(c)	Draw and explain the functional block diagram of ECG machine.	**07**
		OR	
	(c)	Explain ECG amplifications and signal conditioning circuits.	**07**
Q.3	**(a)**	With proper diagram explain generation of bio potential from cell of a human body.	**03**
	(b)	What is ECG noise? How can we remove that noise?	**04**
	(c)	Draw and explain electro-conduction system of heart.	**07**
		OR	
Q.3	**(a)**	What is human nervous system?	**03**
	(b)	Draw and explain the isolation amplifier as a part of signal conditioning circuit.	**04**
	(c)	With suitable functional block diagram explain EEG system.	**07**
Q.4	**(a)**	What is input guarding.	**03**
	(b)	Mention probable ECG faults and explain its trouble shooting.	**04**
	(c)	Explain 10-20 lead system for EEG measurement.	**07**
		OR	
Q.4	**(a)**	Explain the concept of EEG telemetry.	**03**
	(b)	What is micro shock and macro shock hazard?	**04**

	(c)	Explain electrical safety codes and standards for medical instruments.	**07**
Q.5	**(a)**	What is “electrode array”? Briefly explain it.	**03**
	(b)	Explain the classification of EEG signals based on frequency ranges.	**04**
	(c)	With suitable diagram explain chopper stabilized amplifier.	**07**

OR

Q.5	**(a)**	Explain physiological effects of electricity.	**03**
	(b)	Briefly explain maintenance techniques for ECG machine.	**04**
	(c)	Design an instrumentation amplifier for amplifying weak EEG signals. Consider any specific value of measured EEG signal and design a circuit for proper amplification as a part of signal conditioning.	**07**

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