Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2021

Subject Code:2161712 Date:07/08/2021

Subject Name:Bio-Potential Instrumentation

Time:02:30 PM TO 05:00 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	**(a)**	What is bio potential? Explain with example.	**03**
	(b)	Explain generation of action potential and resting potential.	**04**
	(c)	With suitable diagram explain medical instrumentation system and commercial medical instrumentation development process.	**07**
Q.2	**(a)**	Which are noise reduction strategies as a part of bio signal processing?	**03**
	(b)	What is SNR? What is its importance for bio potential and signal processing?	**04**
	(c)	Analyze various types of electrodes used for measuring EEG.	**07**
		OR	
	(c)	Explain the concept of Electrode-Skin interface and also explain polarizable and non-polarizable electrodes.	**07**
Q.3	**(a)**	Explain the concept of cerebral angiography.	**03**
	(b)	What is Neuron? Explain basics of human nervous system.	**04**
	(c)	What analysis can be done based on the range of EEG signals/ classification of signal based on frequency range.	**07**
		OR	
Q.3	**(a)**	What is the concept of BCI? Explain with example.	**03**
	(b)	What is EEG telemetry? Explain in brief.	**04**
	(c)	With suitable diagram explain EEG system in detail.	**07**
Q.4	**(a)**	What do you mean by electrode array?	**03**
	(b)	What is G-H-K equation? Explain it.	**04**
	(c)	With suitable diagram explain electro-conduction system of heart.	**07**
		OR	
Q.4	**(a)**	What is micro shock hazard?	**03**
	(b)	Explain various types of electrodes used for measuring ECG.	**04**
	(c)	Explain ECG machine and its maintenance.	**07**
Q.5	**(a)**	What are the physiological effects of electricity?	**03**
	(b)	Explain troubleshooting and maintenance of ECG machine.	**04**
	(c)	Design an instrumentation amplifier for amplifying weak ECG signals with all necessary equations and circuit diagram.	**07**
		OR	
Q.5	**(a)**	What is macro shock hazard?	**03**
	(b)	Briefly explain electrical safety codes and standards for medical instruments	**04**
	(c)	With suitable diagram explain 10-20 system for EEG measurement.	**07**