Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) EXAMINATION – SUMMER 2024

Subject Code:3140311 Date:20-07-2024

Subject Name: Fundamentals of Biopotentials

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define Biopotentials. Give the Value of Action Potential and Resting Potential.	**03**
	(b)	Explain generation of Biopotential through Cardiac Cell.	**04**
	(c)	Draw and Explain Fundamental Block diagram of Medical Instrumentation System.	**07**
Q.2	**(a)**	Give Full form of: ECG, EEG, EMG.	**03**
	(b)	Define: Accuracy, Precision, Resolution, Reproducibility.	**04**
	(c)	Explain generation and Propagation of Action Potential through Excitable Cell	**07**
		OR	
	(c)	Describe Hodgkin Huxley model with necessary equations.	**07**
Q.3	**(a)**	Draw labelled ECG waveform	**03**
	(b)	Explain Resting State of Excitable Cell in Detail.	**04**
	(c)	Explain Electrode Skin Interface with necessary Circuit Diagram.	**07**
		OR	
Q.3	**(a)**	Define Polarizable and Non-Polarizable Electrodes. Explain with Examples.	**03**
	(b)	Define Half Cell Potential and Explain Nernst Equation.	**04**
	(c)	Explain generation and Recording of Brain Potential. (EEG)	**07**
Q.4	**(a)**	What are the hazard effects of Electricity on Human Body?	**03**
	(b)	Draw and explain Na+ and K+ distributions in a myocardial cell.	**04**
	(c)	Write a Short note on Electroretinography.	**07**
		OR	
Q.4	**(a)**	Describe: Threshold of Perception and LET Go Current.	**03**
	(b)	Draw and explain Ca2+ distribution in a cell.	**04**
	(c)	Explain Grounding System and Ground Fault Circuit Interrupters as Protection system in Detail.	**07**
Q.5	**(a)**	Enlist different Types of EMG and EEG Electrodes.	**03**
	(b)	Draw and Analyze Electrical circuit of Cell Membrane.	**04**
	(c)	Explain Physiology of Na-K ATPase Pump.	**07**
		OR	
Q.5	**(a)**	Enlist Various Bipolar ECG Lead Configuration.	**03**
	(b)	Explain Capacitive and Inductive crosstalk.	**04**
	(c)	Write a short note on Electrical- Safety codes and standards.	**07**

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