

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV(NEW) EXAMINATION – WINTER 2022****Subject Code:3140311****Date:15-12-2022****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) List out the properties of action potentials.	03
(b) Write down a Nernst and GHK Equation and mention their importance.	04
(c) Explain a medical instrumentation system with the help of a generalized block diagram.	07
Q.2 (a) Define Polarizable and Non-Polarizable electrodes.	03
(b) Draw and explain Network equivalent circuits.	04
(c) Write a short note on the origins of Biopotentials.	07
OR	
(c) Explain the action potential with the help of a diagram.	07
Q.3 (a) What is a motion artifact? How to reduce it?	03
(b) Explain the electrode-skin interface with the help of a diagram.	04
(c) Explain a body surface recording electrode and draw a neat diagram of each electrode.	07
OR	
Q.3 (a) What is an ECG? Draw an ECG graph and labeled it.	03
(b) Explain a characteristic of the Electroencephalogram.	04
(c) Explain a lead configuration of ECG with the help of a diagram.	07
Q.4 (a) List out the electrodes used for EMG and EEG and also draw a diagram of each electrode.	03
(b) Write a short note on Electroretinogram.	04
(c) Explain Ca ²⁺ distribution in a cell.	07
OR	
Q.4 (a) Define: Permeability coefficient	03
(b) Explain the exchange and pumping, (Na-K) ATPase Pump with the help of a diagram.	04
(c) Write a short note on the physiology of the Electromyogram.	07
Q.5 (a) What is the need for a Heat sink?	03
(b) List out the Electrical- Safety codes and standards.	04
(c) Explain in detail a basic approach to protection against shock.	07
OR	
Q.5 (a) What are the physiological effects of electricity?	03
(b) Define Macroshock and Microshock hazards.	04
(c) What is the importance of shielding? Explain shielding theory and techniques in detail.	07
