

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2023****Subject Code:3140311****Date:19-01-2024****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: Polarizable and Non-Polarizable electrodes.	03
(b) Draw and explain Equivalent circuit of Cell membrane.	04
(c) Explain the generation of action potential with the help diagram.	07
OR	
Q.2 (a) What is Half-cell potential?	03
(b) Explain GHK Equation and its associated parameters.	04
(c) Explain electrode – electrolyte interface with the help of diagram.	07
OR	
(c) Write a short note on propagation of action potential.	07
Q.3 (a) Explain electrode equivalent circuit with the help of diagram.	03
(b) Draw and explain bipolar limb leads for ECG.	04
(c) Write a brief note on body surface electrodes.	07
OR	
Q.3 (a) Draw an ECG Waveform and explain their components.	03
(b) Write a short note on microfabricated electrode arrays.	04
(c) Draw and explain different percutaneous needle and wire electrode.	07
Q.4 (a) Draw various electrode used for EMG.	03
(b) Explain EEG waveform in detail.	04
(c) Explain 10-20 Electrode system for EEG.	07
OR	
Q.4 (a) What are the functions of (NA-K) ATPase pump?	03
(b) Explain Na ⁺ distribution in myocardial cell.	04
(c) Write a short note on physiology of EMG.	07
Q.5 (a) Define permeability coefficient.	03
(b) Explain the working principle of Heat sink.	04
(c) Write a short note on intracellular and extra cellular ion distributions in myocardial cells.	07
OR	
Q.5 (a) Define Macro shock Hazards.	03
(b) What are the physiological effects of electricity?	04
(c) Explain electrical- safety codes and standards for electrical devices.	07
