

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2021****Subject Code:3140311****Date:03/01/2022****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) Define Polarizable & Non-Polarizable Electrode.	03
(b) Explain electrode – electrolyte interface in detail.	04
(c) What are the types of Biopotential Electrodes? Explain surface electrodes in details.	07
Q.2 (a) What are types of ION Channels? Draw the equivalent circuit of cell membrane.	03
(b) Draw and Explain Electrode circuit model and explain its component.	04
(c) Write a short note on Microelectrodes	07
OR	
(c) Explain the process of action potential with neat diagram	07
Q.3 (a) Draw and explain EEG Waveform	03
(b) What is Nernst equation? Determine the value of Nernst potential for sodium and potassium channel.	04
(c) Explain Medical Instrumentation System with help of diagram.	07
OR	
Q.3 (a) Write a short note on ERG	03
(b) Draw and explain the different percutaneous needle and wire electrodes.	04
(c) Write a short note on physiological effects of electricity.	07
Q.4 (a) Explain the types of EMG electrodes.	03
(b) Draw and explain lead configuration for ECG.	04
(c) Describe the Ca ²⁺ distribution in a cell	07
OR	
Q.4 (a) Explain the GHK equation and its associated parameters.	03
(b) Explain the functions of a (Na-K)- ATPase Pump.	04
(c) Write a short note on intracellular and extracellular ion distributions in a vertebrate myocardial cell.	07
Q.5 (a) Define	03
1) diffusion	
2) diffusion coefficient	
3) Permeability coefficient	
(b) Discuss Macroshock and Microshock hazards.	04
(c) Explain Na ⁺ and K ⁺ distributions in a myocardial cell.	07
OR	
Q.5 (a) What is heat sink? Mention the importance of heat sink.	03
(b) Draw and explain variability of threshold of perception and let go current for men and women.	04
(c) Explain electrical – safety codes and standard for electrical device.	07