

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– VI (NEW) EXAMINATION – WINTER 2021****Subject Code:2161712****Date:04/12/2021****Subject Name:Bio-Potential Instrumentation****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) “Human body as a control system”. Explain this statement with necessary justification.	03
	(b) Give the classification of different types of noise. Enlist the different strategies for noise reduction.	04
	(c) Draw & explain the blood circulatory system of the human body	07
Q.2	(a) Give the categories of errors. Discuss them in brief.	03
	(b) Discuss following terms: Nyquist theorem, Signal to Noise ratio, Noise factor, Noise figure.	04
	(c) Explain in detail the generation of Resting membrane potential.	07
OR		
	(c) What is over-potential? Discuss different factors contributing to generation of over-potential.	07
Q.3	(a) Discuss following terms in brief: CMRR, IMRR, Ground loops	03
	(b) Draw and discuss chopper stabilized amplifier.	04
	(c) Discuss the Ideal characteristics of an op-amp. Draw the circuit diagram of Instrumentation amplifier and derive its gain equation.	07
OR		
Q.3	(a) Discuss in brief: Electrode polarization, Half-cell potential, Perfectly polarizable electrode	03
	(b) Discuss electrode-electrolyte interface in detail.	04
	(c) Explain various types of body surface recording electrodes.	07
Q.4	(a) Draw and explain preamplifier circuit of ECG machine.	03
	(b) Discuss different protections against defibrillation shock in ECG machine.	04
	(c) Write a short note on: i) Various types of ECG readout devices. ii) Common ECG machine Faults & its troubleshooting,	07

OR

- Q.4** (a) Draw & explain electro-conduction system of the heart. **03**
(b) Draw & explain various types of limb leads associated with ECG machine. **04**
(c) Draw detailed block diagram of ECG machine. Explain each of its component in detail. **07**

- Q.5** (a) Discuss the classification of the nervous system. **03**
(b) Draw & discuss the structure of neuron. **04**
(c) Discuss 10-20 electrode placement system for EEG measurement. Also draw & discuss the block diagram of EEG machine. **07**

OR

- Q.5** (a) Enlist basic approaches to shock protection. Discuss any one in detail. **03**
(b) Define microshock. Discuss microshock hazards to human body. **04**
(c) Explain physiological effect of electricity on human body. **07**
