

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI(NEW) EXAMINATION – WINTER 2022****Subject Code:2161712****Date:17-12-2022****Subject Name:Bio-Potential Instrumentation****Time:02:30 PM TO 05:00 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) Draw & explain the block diagram of generalized medical instrumentation system.	03
	(b) "Human body as a control system". Explain this statement with necessary justification.	04
	(c) Discuss the Ideal characteristics of an op-amp. Draw the circuit diagram of Instrumentation amplifier and derive its gain equation	07
Q.2	(a) Explain Digestive system of human body with neat diagram.	03
	(b) What is the purpose of Isolation amplifier? Draw and discuss different types of approaches to design Isolation amplifier.	04
	(c) Discuss the following terms:	07
	i) Nernst formula	
	ii) G-H-K formulation	
	iii) Sodium-potassium pump	
	iv) All or none law	
	v) Resting membrane potential	
	vi) Volume conductor	
	vii) Absolute refractory period	
	OR	
	(c) Explain in detail the generation of Action potential.	07
Q.3	(a) Draw & discuss electrode-electrolyte interface.	03
	(b) What is over-potential? Discuss different factors contributing to generation of over-potential.	04
	(c) Write a short note on: Body-surface recording electrode	07
	OR	
Q.3	(a) Discuss the anatomy & physiology of heart in brief.	03
	(b) Draw & discuss defibrillation protection circuit in ECG machine.	04
	(c) Discuss:	07
	i) Common ECG Machine faults & troubleshooting	
	ii) ECG Machine maintenance	
Q.4	(a) Draw & discuss the electro-conduction system of the heart.	03
	(b) Draw wigger's diagram and discuss cardiac cycle.	04
	(c) Draw & discuss limb lead configuration of ECG. Also discuss ECG noises.	07
	OR	
Q.4	(a) Discuss systemic circulation & pulmonary circulation with their significance.	03
	(b) Enlist any five heart related problems and discuss them in brief.	04

(c) Enlist the ideal properties of preamplifier circuit of ECG. Draw & explain the block diagram of ECG machine. **07**

Q.5 (a) Draw & discuss the structure of neuron. **03**

(b) Discuss the organization of the nervous system in detail. **04**

(c) Draw & discuss 10-20 electrode placement system in EEG machine. Also draw block diagram of EEG machine. **07**

OR

Q.5 (a) Discuss important susceptibility parameter related to electric shock with their relation to human body. **03**

(b) Draw & discuss various physiological effect of electricity on human body. **04**

(c) Give the difference between macroshock and microshock. Also discuss different sources contributing to the generation of microshock. **07**
