Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2024

Subject Code:3171104 Date:30-11-2024

Subject Name: Biomedical Electronics

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 a neuron and provide a brief explanation of its primary function within the nervous system.	**03**
	(b)	Draw ECG read out device.	**04**
	(c)	Explain the standard 12 lead system for ECG measurement in detail.	**07**
Q.2	**(a)**	What is the relationship between Signal-to-Noise Ratio (SNR) and signal quality, and what are the consequences of having a high SNR versus a low SNR?	**03**
	(b)	Discuss the sources of error associated with sensor measurement.	**04**
	(c)	Explain the standard 10-20 electrode system for EEG measurement in detail.	**07**
		OR	
	(c)	Discuss measurement of blood pressure and possible error due to trauma or other physiological effect on patient.	**07**
Q.3	**(a)**	Explain propagation of action potential.	**03**
	(b)	Discuss the classification of biomedical instruments based on their functions and applications.	**04**
	(c)	Explain Microelectrodes in detail with necessary diagrams.	**07**
		OR	
Q.3	**(a)**	Define following terms: Noise Factor, Noise Figure and Noise Temperature.	**03**
	(b)	Draw a block diagram of generalized medical electronics system.	**04**
	(c)	Explain body surface electrodes in detail with necessary diagrams.	**07**
Q.4	**(a)**	Draw an equivalent circuit of bio-potential electrode.	**03**
	(b)	Explain resting state and action state potential.	**04**
	(c)	Discuss the principle and use of Ultrasonic measurements in medical diagnosis.	**07**
		OR	
Q.4	**(a)**	Explain various noise reduction strategies.	**03**
	(b)	Operational Amplifier is best to design bioelectric amplifier. Justify	**04**
	(c)	Explain the working principle of CT scan with block diagram.	**07**
Q.5	**(a)**	Define Micro and Macro shocks.	**03**
	(b)	Enlist various important susceptibility parameters for safety.	**04**
	(c)	Discuss about MRI.	**07**
		OR	
Q.5	**(a)**	Discuss basic approaches to protect against shock.	**03**
	(b)	Discuss EEG frequency bands in detail.	**04**
	(c)	Draw ECG waveform and explain its segments and intervals in detail.	**07**

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