Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (New) EXAMINATION – WINTER 2015

Subject Code:2130303 Date:18/12/2015

Subject Name: Bioelectric Potential & Measurement Techniques

Time: 02.30pm to 05:00pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1		**Short Questions.**	**14**
	1	Quote the amplitude range of nerve potentials.	
	2	Define linearity of sensor.	
	3	What is efficiency of transducer?	
	4	Quote the amplitude range of Electromyogram.	
	5	What is circadian rhythm?	
	6	Which form of energy can be converted into electrical energy by Accelerometer?	
	7	What do you mean by sensitivity drift?	
	8	State the frequency range of Electrooculogram.	
	9	Define Gaussian noise.	
	10	Suggest transducer for measurement of Gastrointestinal forces.	
	11	Define resting potential.	
	12	What do you mean by Quantization error?	
	13	What is normal range of energy of electrical discharge from defibrillators?	
	14	What is the frequency range of current generated for Diathermy?	
Q.2	**(a)**	Describe the method to measure half-cell potential with necessary diagram.	**03**
	(b)	Explain the theorem for conservation of mass & energy.	**04**
	(c)	Contrast the applications of active & passive transducers.	**07**
		OR	
	(c)	Contrast the applications of analog and digital transducers.	**07**
Q.3	**(a)**	Classify various types of needle and wire electrodes.	**03**
	(b)	Represent the equivalent electrical model for Skin-Electrode Interface.	**04**
	(c)	Explain techniques of measurement of EEG with necessary diagrams.	**07**
		OR	
Q.3	**(a)**	Classify various types of surface electrodes.	**03**
	(b)	Interpret the force balance equation for transport processes.	**04**
	(c)	Illustrate the instrumentation for measurement system of EEG with appropriate figures.	**07**
Q.4	**(a)**	Where can be the suitable placement for EMG acquisition? What effects will be there if the placement varies?	**03**
	(b)	Differentiate the applications of Auditory implants and hearing aids.	**04**
	(c)	Briefly describe the generation of muscle action potential with necessary diagrams.	**07**
		OR	
Q.4	**(a)**	Determine the requirements of automated diagnosis of bioelectric	**03**

potentials.

	(b)	Contrast Nerve and Muscle Stimulators.	**04**
	(c)	Briefly describe the nerve impulse transmission through spinal cord with necessary diagrams.	**07**
Q.5	**(a)**	Relate the Measurement of heart rate and cardiac output with necessary validations.	**03**
	(b)	Enlist the types of various arrhythmias.	**04**
	(c)	Identify the applications of Functional Electrical Stimulation.	**07**

OR

Q.5	**(a)**	List the parameters that can be measured by multi-parameter monitoring device.	**03**
	(b)	Predict the applications of cardiac pacemaker in arrhythmic patients.	**04**
	(c)	Explain various types of brain signals with graphs.	**07**

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