Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2140306 **Date: 06/06/2017**

Subject Name: Biosensors & Transducers

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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Give me the name of Metal pair used in T type of Thermocouple.	
	2	What is the difference between Active and Passive transducers?	
	3	Define Hysteresis phenomena.	
	4	What do you mean by Rosettes?	
	5	Enlist any three transduction principles with name of their transducers.	
	6	What are the uses of capacitive transducer?	
	7	Define Piezoelectric phenomenon.	
	8	Give working principle of Hall effect transducers.	
	9	Give major limitations of piezoelectric transducers.	
	10	What is the role of Pacinian corpuscles and where it is located in human body?	
	11	What is the role of Meissner's corpuscle and where it is located in human body?	
	12	Enlist name of AC bridges.	
	13	What is the pH of blood?	
	14	How p-n junction can be used to measure temperature?	
Q.2	**(a)**	A strain gauge with gauge factor of 4 has a resistance of 400 Ω. It is used in a test in which strain to be measure may be as low as 5×10^{-6}. What will be changes in the resistance of Gauge?	**03**
	(b)	A thermistor probe material has constant B= 4500K. When used for body temperature measurement, its resistance is measured 85 ohm at 37 degree Celsius. Determine its resistance at 20 degree Celsius	**04**
	(c)	Explain circuit used to remove nonlinear characteristics of thermistor.	**07**
		OR	
	(c)	Explain working principle of thermocouple with cold junction compensation techniques.	**07**
Q.3	**(a)**	Write a short note on organization of nervous system.	**03**
	(b)	Explain working principle of linear variable differential transformer with necessary circuits.	**04**
	(c)	Explain capacitive displacement transducers and derive its equation of sensitivity.	**07**
		OR	

Q.3	**(a)**	Explain methodology used to measure respiration rate.	**03**
	(b)	Explain working of angular digital encoders.	**04**
	(c)	Draw schematic of Electromagnetic blood flow meter and explain its engineering aspects.	**07**
Q.4	**(a)**	How thermoreceptors maintain body temperature?	**03**
	(b)	Explain relationship between chemoreceptors and blood pressure.	**04**
	(c)	Draw schematic of Unbonded strain gauge pressure transducers and Give detail explanation.	**07**
		OR	
Q.4	**(a)**	Explain working principle of Polarographic clark PO_2 sensor.	**03**
	(b)	Explain any one nuclear radiation sensor.	**04**
	(c)	Explain fiber optic blood pressure transducers with necessary schematics.	**07**
Q.5	**(a)**	Explain working of microbial biosensor.	**03**
	(b)	Explain invasive method of Blood pressure measurement.	**04**
	(c)	Draw & Explain the block diagram of smart sensors.	**07**
		OR	
Q.5	**(a)**	Discuss any Liquid level measurement technique.	**03**
	(b)	Explain working principle of Glucose sensor.	**04**
	(c)	Explain construction and working of Rotameter transducer.	**07**

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