Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3161008 Date:08/06/2022

Subject Name:Sensors and 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define: (1) Sensitivity (2) Repeatability (3) Hysteresis.	**03**
	(b)	What is meant by two wire and three wire sensors? Give example for each type.	**04**
	(c)	Discuss about types of errors in measurement system and explain how they are corrected?	**07**
Q.2	**(a)**	Discuss why thermocouples require a reference junction.	**03**
	(b)	Differentiate the characteristics of RTD and Thermistor.	**04**
	(c)	Explain construction and working principle of potentiometer. Evaluate its application as motion sensor.	**07**
		OR	
	(c)	Summarize the construction, principle, working of thermistor and its resistance temperature characteristic.	**07**
Q.3	**(a)**	Define Gauge Factor of Strain Gauge.	**03**
	(b)	Define Dark Resistance and list out some materials used for construction of LDR.	**04**
	(c)	Define Piezo Electric effect. Draw the equivalent circuit of a Piezoelectric crystal and derive the transfer function of Piezo Electric transducer.	**07**
		OR	
Q.3	**(a)**	How can optical fiber be used for stress sensing?	**03**
	(b)	What is meant by Tactile Sensor?	**04**
	(c)	Explain the principle, construction, working and applications of Ultrasonic Flow Meter with neat sketches.	**07**
Q.4	**(a)**	Write limitations of Wheatstone Bridge.	**03**
	(b)	Show the block diagram of Smart Sensor Architecture.	**04**
	(c)	Draw Maxwell's Bridge circuit and derive the expression for the unknown element at balance.	**07**
		OR	
Q.4	**(a)**	Write advantages of AC Bridges.	**03**
	(b)	Compare MEMS Sensors and Nano Sensors.	**04**
	(c)	Draw Wein's Bridge Circuit and derive expression for the unknown element at balance.	**07**
Q.5	**(a)**	A 10 bit ADC has a full scale of 10.230 V. When digital output is $(11\ 1111\ 1111)_2$, the quantization error of ADC in millivolts is _____ .	**03**
	(b)	Compare Weighted Resistor DAC and R-2R Ladder DAC.	**04**
	(c)	With a neat circuit diagram, explain construction and working of 3 bit R-2R ladder DAC.	**07**

OR

Q.5	**(a)**	An 8-bit Unipolar DAC has a full scale voltage range from 0V to 7.68 V. If the digital input code is $(10010110)_2$, then the analog output is _____ .	**03**
	(b)	Explain Single Channel Data Acquisition System with suitable block diagram.	**04**
	(c)	Explain operation of Successive Approximation ADC.	**07**

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