Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3160620 Date:28-11-2024

Subject Name:Instrumentation and Sensors

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)**	List various physical variable.	**03**
	(b)	Explain types of instrumentation.	**04**
	(c)	Compare with necessary examples: Permanent installation and Temporary installation.	**07**
Q.2	**(a)**	Define: i) Transducer ii) Sensor.	**03**
	(b)	Explain Measurement uncertainty.	**04**
	(c)	Write a short note on Predict the response of sensors to various inputs	**07**
		OR	
	(c)	Construct a conceptual instrumentation and monitoring program.	**07**
Q.3	**(a)**	Decide the order and methodology for sensor installation.	**03**
	(b)	List Criteria for Sensor selection.	**04**
	(c)	Explain the Working Principle of Strain Gauge with its application and derive the expression of Gauge Factor.	**07**
		OR	
Q.3	**(a)**	Explain the types of sensors	**03**
	(b)	List Criteria for Sensor siting.	**04**
	(c)	Explain in brief about data reduction and interpretation with necessary example	**07**
Q.4	**(a)**	Define: Signal and Noise.	**03**
	(b)	Explain Time domain signal processing.	**04**
	(c)	You are a civil engineer analyzing the compressive strength of concrete samples (in MPa) from three suppliers. Given the following data: Supplier A: 34, 36, 35, 33, 34, 36, 34, 37, 36, 35 Supplier B: 38, 39, 37, 40, 36, 39, 38, 37, 38, 40 Supplier C: 32, 31, 33, 31, 34, 33, 32, 35, 34, 31 Based on your analysis of statistical measures (average, standard deviation, mode, and range), provide recommendations for selecting a concrete supplier for this project	**07**
		OR	
Q.4	**(a)**	Define following term 1. Mode 2. Range	**03**

	(b)	Show the use of following given sensor, 1. Piezometer 2. Inclinometer	**04**
	(c)	Justify the following terms in the context of normal frequency distribution of data (a) Mean Value, (b) Deviation, (c) Average deviation, (d) Variance, (e) standard deviation	**07**
Q.5	**(a)**	Discuss Noise reduction with filters.	**03**
	(b)	Explain Fourier Transform & its application.	**04**
	(c)	Explain the need for frequency domain analysis and its principles.	**07**

OR

Q.5	**(a)**	Discuss the below terms, 1. Leakage 2. Frequency Resolution	**03**
	(b)	Summarize on the data analysis and interpretation with reference to inclinometer.	**04**
	(c)	What is FFT and explain its application in civil engineering.	**07**

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