Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–IV EXAMINATION – WINTER 2025

Subject Code:3141709 Date:20-11-2025

Subject Name:Principle of Measurement Science

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)**	Define performance characteristic of the instrument for following terms of briefly 1. Drift 2. Threshold 3. Hysteresis	**03**
	(b)	Why Mass-Spring-Dashpot mechanical system recognized as Second order system? Give its proper explanation.	**04**
	(c)	Demonstrate the working of an instrument with its functional diagram. Give the reason why signal conditioning (Intermediate) block is called the heart of an instrument.	**07**
Q.2	**(a)**	Compare power operated VS self-operated transducers.	**03**
	(b)	Explain Air-Bubbler system with proper instrumentation for liquid level measurement.	**04**
	(c)	Illustrate the working of following level measurement techniques with neat sketch and its benefits (1) Diff. Pressure (2) RF Admittance (3) Float	**07**
		OR	
	(c)	What are the zero Suppression and Elevation? Implement Level measurement technique with zero suppression.	**07**
Q.3	**(a)**	Describe types of pressure. Give explanation for Total pressure VS dynamic pressure.	**03**
	(b)	Demonstrate the working of McLeod gauge with its benefits and limitation	**04**
	(c)	Give explanation of any resistive type pressure measurement method. List its advantages over conventional mechanical approach.	**07**
		OR	
Q.3	**(a)**	Illustrate with neat sketch and mathematical expression, how U-Tube manometer measure differential pressure.	**03**
	(b)	Classy Flapper nozzle assembly as displacement to force converter..	**04**
	(c)	Why dead weight tester called as primary standard of calibration for pressure? Describe calibration procedure with neat sketch using dead weight tester.	**07**
Q.4	**(a)**	Illustrate inter-relation of available temperature scale.	**03**
	(b)	Why the material will exhibits change in its electrical resistance when exposed to temperature? Classify such resistive temperature transducer with its temperature measuring range.	**04**

	(c)	Draw and describe construction, working and limitation of 3-wire RTD based temperature measurement. How it eliminates 2-wire method limitation?	**07**
		OR	
Q.4	**(a)**	Elucidate the black body concept for Pyrometer function	**03**
	(b)	Justify the need of temperature compensation for temperature measurement.	**04**
	(c)	Draw and describe Temperature measurement system using K-type thermocouple? List its temperature measurement range, its sensitivity and disadvantages.	**07**
Q.5	**(a)**	Classify Flow measurement technique with name of flow meter	**03**
	(b)	Obtain Bernoulli equation for incompressible fluid.	**04**
	(c)	Draw and describe operating principle, working, construction and limitation of Electro-Magnetic type Flow meter.	**07**
		OR	
Q.5	**(a)**	Differentiate volumetric flow VS mass flow	**03**
	(b)	Explain working with operating principle of Venturi Tube as Flow meter.	**04**
	(c)	Describe Ultrasonic Transit-time Flow meter. How it will best suited as non-contact measurement approach?	**07**

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