Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VI (NEW).EXAMINATION – WINTER 2016

Subject Code: 2162005 Date: 25/10/2016

Subject Name: Electro Mechanical Measurements & Instruments

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.**

Q.1	**(a)**	Explain stroboscope with neat sketch and give related equations.	**07**
	(b)	Discuss the difficulties in measurement of high resistance and explain the operation of "Megohm bridge".	**07**
Q.2	**(a)**	Discuss the AC and DC errors encountered in moving iron instruments along with its remedies.	**07**
	(b)	Differentiate between mechanical and electrical instruments.	**07**
		OR	
	(b)	State the types of errors in measurement and briefly explain any two with examples and related sketches.	**07**
Q.3	**(a)**	Write a short note on Hydraulic and pneumatic load cells giving neat sketches.	**07**
	(b)	Explain the operation of "Modern Laboratory Type DC Potentiometer" with necessary steps and neat diagram.	**07**
		OR	
Q.3	**(a)**	Derive the governing equation for first order instrument subjected to step input giving necessary equations and sketches with response.	**07**
	(b)	List the various strain gauge circuits for signal conditioning and derive the output equation of full bridge strain gauge circuit and also discuss its advantages over quarter bridge and half bridge strain gauge circuits.	**07**
Q.4	**(a)**	What is the importance of curve fitting in measurements? Explain with necessary equations how is it carried out for different functional relationships.	**07**
	(b)	Define (i) range (ii) span (iii) hysteresis with examples and related sketch.	**07**
		OR	
Q.4	**(a)**	Define mean, deviation, average deviation, standard deviation etc. with example. State the importance of them in measurement system.	**07**
	(b)	Briefly explain (i) static correction (ii) error calibration curve giving example and related equation.	**07**
Q.5	**(a)**	Explain the construction and working principle of RTD and compare it with thermocouples and thermistors.	**07**
	(b)	What is Piezoelectric effect? Derive the output equation of piezoelectric transducer and justify that steady state response of piezoelectric transducer is zero.	**07**
		OR	
Q.5	**(a)**	List the analog to digital converters and explain any one in detail.	**07**
	(b)	A capacitive transducer uses two quartz diaphragms of area 750 mm^2 separated by a distance of 3.5 mm. A pressure of 900 kN/m^2 when applied to the top diaphragm produces a deflection of 0.6 mm. The capacitance is 370 pF when no pressure is applied to the diaphragms. Find the value of capacitance after the application of a pressure of 900 kN/m^2.	**07**

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