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

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2016

Subject Code:2162005 **Date:11/05/2016**

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 (i) Linearity (ii) Threshold and (iii) Drift with suitable examples. **07**

(b) What is the need of guard circuit and explain in detail the Loss of Charge method for measurement of high resistance. **07**

Q.2 **(a)** Explain how the range of PMMC type instruments can be extended as an ammeter and voltmeter with diagrams. **07**

(b) List the various methods for measurement of shaft power and explain any one method for it in detail. **07**

OR

(b) List the different torque measurement techniques and explain how strain gauges are used for measurement of shaft torque. **07**

Q.3 **(a)** Write a short note on measurement methods with suitable examples and sketches. **07**

(b) Describe the operation of slide wire potentiometer and explain the "Standardization" process" with the help of it. **07**

OR

Q.3 **(a)** Successive masses of 1 kg were hung from a wire and the position of a mark at its lower end was measured. The following data was recorded: **07**

Load (N)	0	1	2	3	4	5	6	7
Position of Mark (cm)	5.1	5.2	5.28	5.31	5.36	5.43	5.49	5.55

Determine the constants m and c for the best straight line $y = mx + c$ fitting these observations.

(b) Derive the expression for gauge factor of electrical resistance type strain gauge in terms of Poisson's ratio. **07**

Q.4 **(a)** During a test run, measurements of temperature were made 100 times with variations in apparatus and procedures. After applying corrections for the known systematic errors, the following data were recorded: **07**

Temperature (^{0}C)	97	98	99	100	101	102	103	104	105
Frequency of occurrence	2	5	9	19	33	18	8	4	2

Make calculations for the arithmetic mean, the average deviation, standard deviation, variance and the probable error of the reading.

	(b)	Briefly explain the time domain and frequency domain analysis for measurement and control systems.	**07**
		OR	
Q.4	**(a)**	Briefly explain zero, first and second order systems giving suitable examples and governing equations.	**07**
	(b)	Differentiate between mechanical and electrical measuring instruments in tabular format.	**07**
Q.5	**(a)**	What is a need of cold junction compensation in thermocouple and explain any one technique for that.	**07**
	(b)	Discuss the advantages and disadvantages of LVDT/RVDT with its remedies.	**07**
		OR	
Q.5	**(a)**	Explain the “Fall of Potential” method for measurement of earth resistance with neat sketch.	**07**
	(b)	Prove that piezo-electric transducer cannot detect the steady state quantities and can measure only dynamic quantities.	**07**

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