Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VI EXAMINATION – WINTER 2015

Subject Code:162005 **Date:10 /12/ 2015**

Subject Name: Electromechanical Measurements & Instruments

Time:2:30pm to 5:00pm **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 the terms: (i) Span (ii) Drift and (iii) Overshoot with related examples and sketch. **07**

(b) State the methods used for measurement of high resistance and describe the operation of "Meg-ohm bridge" with neat sketch. **07**

Q.2 **(a)** Describe the construction and working of PMMC instruments and derive its deflecting torque equation with advantages and disadvantages. **07**

(b) Describe (i) operational errors and (ii) instrument errors with suitable examples. **07**

OR

(b) Explain giving example: (i) data transmission element and (ii) data presentation element. **07**

Q.3 **(a)** The following data are expected to follow a linear relationship of the form y=ax+b.Obtain the best linear relation in accordance with a least square analysis. Calculate the standard deviation of the data from result. **07**

x	0.9	2.3	3.3	4.5	5.7	6.7
y	1.1	1.6	2.6	3.2	4.0	5.0

(b) Draw the circuit diagram of a Crompton's potentiometer and explain its working. Describe the steps used when measuring an unknown resistance. **07**

OR

Q.3 **(a)** Discuss the equation for time response of second order system subjected to step input. Show the required figure. **07**

(b) Explain in detail the "Digital Data Acquisition System" with all its functional elements and neat sketch. **07**

Q.4 **(a)** Write a short note on force measurement using stain gauges with neat sketch. **07**

(b) Write a short note on rope brake dynamometer for torque measurement giving neat sketch. **07**

OR

Q.4 **(a)** Briefly discuss the methods of speed measurement with neat sketches. **07**

(b) Write a short note on 'Piezoelectric Accelerometer' with neat sketch and working. **07**

Q.5 **(a)** Explain the working principle, construction and output characteristic of RVDT with advantages and disadvantages. **07**

(b) A single strain gauge having resistance of 120 Ω is mounted on a steel cantilever beam at a distance of 0.15 m from the free end. An unknown force F applied at the free end produces a deflection of 12.7 mm of the free end. The change in gauge resistance is found to be 0.152 Ω. The beam is 0.25 m long with a width of 20 mm and a depth of 3 mm. The Young's modulus for steel is 200 GN/m^2. Calculate the gauge factor. **07**

OR

Q.5	**(a)**	Prove that the sensitivity of Column type load cell is $2(1+\mu)$ times greater than the highest sensitivity achieved with the single active strain gauge in a quarter bridge.	**07**
	(b)	Why cold junction compensation is required in thermocouples? Explain any one technique of cold junction compensation in thermocouples with required circuit diagram.	**07**

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