Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 714703N **Date: 06-01-2014**

Subject Name: Sensor Technology

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary and clearly mention the same.**
3. **Figures to the right indicate full marks.**
4. **Draw neat diagrams. Shabbily drawn diagrams may not be awarded any credit.**

Q.1	**(a)**	Explain the concept of sensitivity of sensor in one-dimensional and two-dimensional transfer function with suitable examples.	**07**
	(b)	What is nonlinearity of a sensor? What are the different ways to specify nonlinearity of sensor? Explain all of them briefly.	**07**
Q.2	**(a)**	Write a brief note on dynamic characteristics of sensors.	**07**
	(b)	How does the calibration perform for the sensors with linear and non-linear response? Discuss in detail.	**07**
		OR	
	(b)	1. Evaluate the sentence - For the sensors with very broad and non-linear response characteristics, a dynamic range of input stimuli is often expressed in decibels. 2. Differentiate between accuracy and resolution in presence of mechanical error for a given sensor. Support your answer with neat diagram.	**07**
Q.3	**(a)**	Explain the shape factor for parallel plate capacitor and coaxial capacitor with neat schematic diagrams.	**07**
	(b)	Describe the working principle of solenoid and toroid with the help of neat schematic diagrams.	**07**
		OR	
Q.3	**(a)**	Name the sensor which works on thermo-electric principle. How is that sensor utilized to measure the cutting temperature during machining operation? Give complete detail of machining set up with this sensor.	**07**
	(b)	Compare and contrast functioning bimetal laminated coil and bimetal laminated plate as temperature transducer. Support your answer with suitable diagrams.	**07**
Q.4	**(a)**	Draw and briefly explain parallel and serial laminated piezoelectric sensors and their corresponding equivalent circuits. Also discuss about the practical application of these capacitive piezoelectric sensors.	**07**
	(b)	Describe the working principle of hall effect sensor with its circuit diagram and give description on its practical applications.	**07**
		OR	
Q.4	**(a)**	How does a Fabry-Perot sensor work to measure temperature? Use the working principle of Fabry-Perot sensor to describe temperature measurement.	**07**
	(b)	Evaluate the statement - Magnetostrictive sensor is utilized for position measurement.	**07**
Q.5	**(a)**	Illustrate the working principle of proximity detector which uses polarized light to detect the presence or absence of metallic objects in its vicinity. Draw appropriate sketches to support your response.	**07**
	(b)	Evaluate the statement - V-scanning of absolute encoder has superior characteristics over normal scanning of absolute encoder.	**07**
		OR	

Q.5 **(a)** Describe the method to determine direction of movement of incremental encoders. **07**

(b) Briefly describe the following surface processing techniques used in sensor manufacturing. **07**

1. Sputtering
2. Chemical Vapor Deposition

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