Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–I(New course)• EXAMINATION – WINTER- 2015

Subject Code: 2714703 **Date: 02/01/2016**

Subject Name: Sensor Technology

Time:2:30 pm to 5:00 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)** Describe the following capacitive sensors in brief: **07**

1. Mono-polar capacitive sensor
2. Differential capacitive sensor

(b) Explain briefly various binary tactile sensors available for different robotic applications. **07**

Q.2 **(a)** Evaluate the statement: Proximity detector with polarized light can be made non-sensitive to reflective metallic objects. Support your answer with the help of neat sketch. **07**

(b) With the help of neat schematic diagram describe the principle of magneto-strictive detector for the application of position measurement. **07**

OR

(b) Produce a set up which measures forces acting on robotic hand in all directions with the help of strain gauges as sensing unit. Support your answer with neat schematic diagram/s. **07**

Q.3 **(a)** Justify the statement. – "Linearity when not accompanied by a statement explaining what sort of straight line it is referring to is meaningless." **07**

(b) Describe that the hall effect sensor is utilized as binary as well as analog device. Give suitable examples and explain. **07**

OR

Q.3 **(a)** Evaluate the following statements. **07**

1. Magnetic field strength of a toroid is not same inside and outside of it.
2. A "Good" capacitive sensor is not useful for making a sensor out of it.

(b) Explain the dynamic (time dependent) characteristics of sensors with suitable equations and relevant description. **07**

Q.4	**(a)**	Design an automatic system based on the principle of light reflection and triangular measurement for measuring the height of metallic objects moving on conveyer belt in sequence one after the other. Draw the line diagram of the complete set up showing the flow of material and sensors for data acquisition.	**07**
	(b)	Describe the following terms briefly. 1. Active and passive sensors 2. Pre-aging of sensor 3. Self-heating effect of sensor and its remedies	**07**

OR

Q.4	**(a)**	Describe different slip sensing methods for material handling application. Also explain about the role played by the slip sensing device to control the sensitivity of concerned methods.	**07**
	(b)	Explain in brief the manufacturing process of making artificially polarized Piezoelectric sensing material.	**07**
Q.5	**(a)**	Explain the method of direction control in case of linear incremental encoders for the measurement of linear distance.	**07**
	(b)	Explain the use of LVDT for the measurement of temperature variation of gaseous fluid contained in a vessel.	**07**

OR

Q.5	**(a)**	Evaluate the following statement with suitable example: Improvement in the resolution of absolute encoder depends on number of tracks as well as number of encoders.	**07**
	(b)	For remote sensing application of radioactive material handling, explain the use and working of Synchro transmitter and Synchro receiver in combination with each other. Give appropriate circuit diagram which incorporates both the Synchro transmitter and Synchro receiver connected together.	**07**

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