Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II– EXAMINATION – WINTER - 2016

Subject Code: 2722105 **Date: 17/11/ 2016**

Subject Name: Experimental Techniques and Instrumentations in Thermal Engineering

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)**	What is the Taguchi approach? Who is Taguchi? What are the common areas of application of this technique?	**07**
	(b)	Define the terms (1) Range (2) Repeatability (3) Accuracy (4) Precision (5) Dead Zone (6) Hysteresis (7) Drift	**07**
Q.2	**(a)**	Define and discuss in brief following dynamic characteristic of a measurement system: (1) Speed of response (2) Fidelity (3) Measuring lag (4) Dynamic error	**07**
	(b)	What is error? Discuss the various types of errors.	**07**
		OR	
	(b)	Does the accuracy of an optical pyrometer depend on its distance from the object? If so, Why?	**07**
Q.3	**(a)**	What are the precautions to be taken in the use of thermocouples?	**07**
	(b)	Sketch a typical radiation pyrometer, explain its working and list its notable characteristics.	**07**
		OR	
Q.3	**(a)**	What are Thermistors? Explain the characteristics of Thermistors.	**07**
	(b)	Explain clearly the law of intermediate temperatures and the law of intermediate metals used in thermocouples. Discuss the influence of these laws on the industrial usages of thermocouples.	**07**
Q.4	**(a)**	Give the schematics of a hydraulic control system and describe the functions of its various components. In which way the constant flow arrangement differs from constant pressure arrangement?	**07**
	(b)	State the necessity of a data acquisition system. Present the schematics of such a system and point out the function of each element comprising it.	**07**
		OR	
Q.4	**(a)**	Give the schematics of a Pneumatic control system and describe the functions of its various components. Also state the advantages and disadvantages of pneumatic controllers.	**07**
	(b)	Describe any speed, tank-level or any other suitable control system which employs (1) Proportional (2) integral (3) derivative control. Why these control actions are not used alone?	**07**
Q.5	**(a)**	State the objectives of flow visualization. List the different flow visualization technique and discuss in detail about hydrogen bubble technique.	**07**
	(b)	Explain with neat sketch of principle of operation of Laser Doppler anemometer.	**07**
		OR	
Q.5	**(a)**	Give schematic and discuss in detail about the interferometer.	**07**
	(b)	Draw and explain the gas chromatograph. State the name of different products of combustion measured with it.	**07**

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