Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-III Regular Examination January 2011

Subject code: 731001

Subject Name: Low temperature measurement and instrumentation

Date: 08 /01 /2011 **Time: 02.30 pm – 05.00 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 are the different types of errors in measurement? **07**

Resistance of a certain resistor is measured repeatedly to obtain following data.

Number	1	2	3	4	5	6	7	8	9
R, kΩ	1.22	1.23	1.26	1.21	1.22	1.22	1.24	1.22	1.19

What is the best estimate for the resistance? What is the error with 95% confidence?

(b) Explain the following : Accuracy, Sensitivity, Reproducibility, Stability. **07**

Q.2 **(a)** What are the different types of transducers? Explain with neat sketch ultrasonic transducers. **07**

(b) Explain the principle of operation of electric resistance gauge. Differentiate between movable electric resistance liquid level gauge and fixed electric resistance liquid level gauge. **07**

OR

(b) Explain with a neat sketch principle of operation, construction and working of thermodynamic liquid level gauge. **07**

Q.3 **(a)** Describe in brief the principle of operation, construction and working of pirani gauge with the help of a neat sketch. How is the sensitivity of this gauge defined? **07**

(b) Name different mechanical vacuum gauges.Explain with a neat sketch bellows type vacuum gauge. **07**

OR

Q.3 **(a)** State the principle of operation, construction and working of McLeod gauge. Why is it used as an absolute pressure gauge? **07**

(b) Explain with a neat sketch fluid quality meter used for cryogens. **07**

Q.4 **(a)** Enlist different types of thermometers with their range of application used to measure temperatures in cryogenic range. Explain platinum resistance thermometer with its principle of operation and working. **07**

(b) Explain with a neat sketch principle and working of vapour pressure thermometer. List various liquids used with its temperature range. **07**

OR

Q.4 **(a)** With the help of neat sketch, explain constant volume thermometer giving temperature expressions. Enumerate the different corrections made for high precision. **07**

(b) Explain with a neat sketch construction, working and operating principle of acoustic liquid level gauge. **07**

Q.5 **(a)** Which are the factors to be considered in the selection of flow meters? Explain with a neat sketch turbine flow meter. **07**

(b) Name various non destructive methods of testing. Explain magnetic particle inspection method of non destructive testing. **07**

OR.

Q.5 **(a)** Explain the instrumentation for measurement of density using buoyancy . **07**

(b) What is noise. Give its unit. Name different type of noise. Explain phase noise and amplitude noise. What is the difference between noise and signal? **07**

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