

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**ME Semester –III Examination Dec. - 2011**

**Subject code: 731001**

**Date: 05/12/2011**

**Subject Name: Low Temperature Measurement and Instrumentation**

**Time: 10.30 am – 01.00 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)** Explain the functional stages of measuring systems with a line diagram. Explain clearly the difference between (i) Accuracy and Precision (ii) Span and Range (iii) Dead zone and Dead time with neat free sketches **07**
- (b)** List out the all various types of thermometers and explain working principle of resistance type thermometer and vapour pressure thermometer with neat sketch **07**
- Q.2 (a)** Explain step response of the second order under damped systems. Draw a sketch of response for various damping ratio  $\zeta$ . What should be the ideal range of  $\zeta$  for good control system? Explain why? **07**
- (b)** Enlist the various types of sensors and transducers. Explain (1) capacitive transducers (2) piezoelectric transducer sensors with neat sketches. **07**
- OR**
- (b)** What are the selection criteria for instrument transducers? Write a short note on LVDT with neat sketch stating clearly merits and demerits. **07**
- Q.3 (a)** Give detail Classification of flow measuring instruments. Write a note on flow visualization with a neat sketch. **07**
- (b)** Explain calibration of level measuring instruments. Explain how the capacitance level sensor is used for level measurement with neat sketch? **07**
- OR**
- Q.3 (a)** What are variable area flow meters? Explain (i) ultrasonic flow meter. (ii) Electromagnetic flow meters. **07**
- (b)** Explain working of hot wire anemometer with neat sketch and advantages and disadvantages. **07**
- Q.4 (a)** Explain (1) McLeod Gauge (2) Knudsen gauge for vacuum measurement. **07**
- (b)** Enlist various techniques for sound measurement. Explain how the sound is measured with microphones. Also write a note on capacitor microphone. **07**
- OR**
- Q.4 (a)** Explain working of (1) piezoelectric pressure transducer (2) strain gauge type pressure transducer with neat sketches. **07**
- (b)** State various methods used for density measurement write a note on density measurement by differential pressure (D/p) transmitter methods. **07**

**Continue...**

- Q.5 (a)** Explain (i)  $^3\text{He}$  melting curve thermometer (ii) Infrared thermometer with neat sketch. **07**
- (b)** Write a short note on radiography as a non- destructive testing method. **07**
- OR**
- Q.5 (a)** How the calibration of thermometer is done? Explain errors and precautions in temperature measurement. **07**
- (b)** Explain ultrasonic techniques used for non destructive testing. **07**

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