

**GUJARAT TECHNOLOGICAL UNIVERSITY****B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012****Subject code: 170904****Date: 27/12/2012****Subject Name: Industrial Instrumentation****Time: 10.30 am - 01.00 pm****Total Marks: 70**

Instructions:

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain the following characteristics of a Transducer. 7  
 (i) Linearity (ii) Resolution (iii) Sensitivity (iv) Threshold  
 (v) Repeatability (vi) Calibration (vii) Hysteresis.
- (b) Describe the working principle of strain gauge. State its applications. Obtain the relationship:  $G.F = 1 + 2\nu + \frac{\Delta\delta/\delta}{\Delta L/L}$  7
- Q.2** (a) Differentiate unbonded and bonded type strain gauge. How is the temperature compensation carried out using strain gauge in a bridge circuit? 7
- (b) Explain the construction and working principle of LVDT. Explain how the magnitude and direction of the displacement of core of LVDT can be detected. 7
- OR**
- (b) List different principles involved behind weight measurements and explain strain gauge load cell for weight measurement. 7
- Q.3** (a) Describe the construction, theory and working principle of thermocouples. Describe different types of compensations used and also the methods of measurement of their output voltage. 7
- (b) Explain the principle of operation and construction of RTD. Also explain Muller Bridge configuration for the temperature measurement using RTD. 7
- OR**
- Q.3** (a) Define the following (i) Absolute Pressure (ii) Gauge Pressure (iii) Differential Pressure. Explain how this pressure can be measured by an Inductive transducer? 7
- (b) Explain the use of Thermistor for temperature measurement. 7
- Q.4** (a) State and explain various principles of operation of Capacitive Transducers for level measurements. 7
- (b) Describe dynamic characteristics of piezo electric transducer. Obtain the relationship of piezo electric transducer output voltage and voltage sensitivity, pressure and thickness of crystal. 7
- OR**
- Q.4** (a) Explain Black Body concepts for very high temperature measurements. Describe with neat diagram how disappearing filament type optical pyrometer can measure very high temperature. Mention its merit and demerits. 7
- (b) Describe with neat sketch the construction and working of Rotameter. State its Advantages and Disadvantages. 7
- Q.5** (a) Describe the schematic of strip chart recorder and describe its working and construction of each component. Compare with circular chart recorder. 7
- (b) Describe the construction and working principle of Electro-magnetic type flow meter, with its merit and demerits. 7
- OR**
- Q.5** (a) Write Short Notes on 10  
 (i) Macleod gauge (ii) Pirani gauge
- (b) What is Hall effect? Describe the construction, working principle of Hall effect transducers. 4

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