

**GUJARAT TECHNOLOGICAL UNIVERSITY****M. E. - SEMESTER – II • EXAMINATION – WINTER • 2013****Subject code: 1720310****Date: 04-01-2014****Subject Name: Industrial Measurements****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 construction and working of Linear Variable Differential Transformer with its advantages. **07**
- (b) Draw the block diagram and explain all the stages of generalized measurement system in detail. **07**  
Draw the block diagram of pressure actuated thermometer with suitable diagram.
- Q.2** (a) Explain the construction and working of ultrasonic thermometers. **07**
- (b) Define the followings terms, **07**
- |                  |                 |
|------------------|-----------------|
| i) Backlash      | ii) Calibration |
| iii) Sensitivity | iv) Hysteresis  |
| v) Precision     | vi) Threshold   |
| vii) Drift       |                 |
- OR**
- (b) Explain working principle, construction and working of McLeod gauge with neat sketch. **07**
- Q.3** (a) Explain different types of orifice plates and write advantages and disadvantages of orifice plates. **07**
- (b) Explain principle, construction and working of optical pyrometer with neat sketch. **07**
- OR**
- Q.3** (a) Explain Strain Gauge Pressure Transducer with neat sketch with its advantages. **07**
- (b) Explain the construction and working of bell type pressure gauge with neat sketch. **07**
- Q.4** (a) Explain construction and working of in line rotating torque sensor with neat sketch. **07**
- (b) Explain construction and working of Laser Doppler Velocimeter with neat sketch. **07**
- OR**
- Q.4** (a) Explain the working principle of pH measurement with its applications. **07**
- (b) Explain the various factors to be considered during selecting a transducer for a specific application. **07**
- Q.5** (a) Explain the construction and working of air purge system for level measurement with its advantages. **07**
- (b) Explain advantages, disadvantages and applications of strip chart recorder. **07**
- OR**
- Q.5** (a) Explain Pulse Duration Modulation (PDM) and Pulse Position Modulation (PPM) with neat sketch. **07**

- (b) A bimetal strip is constructed of strips of nickel-chrome-iron alloy and invar bonded together at  $25^{\circ}\text{C}$ . The strip is 50 mm long and each material has a thickness of 1 mm. Calculate: 07

- i) Radius of curvature produced when the strip is subjected to a temperature of  $200^{\circ}\text{C}$  and the movement of the free end in a perpendicular direction from the initial line.
- ii) How the results would change when the strip is initially in the form of a cantilever with one end fixed and other free.

Assume the following data:

For invar:  $\alpha_1 = 1.7 \times 10^{-6}$  per  $^{\circ}\text{C}$  and  $E_1 = 1.5 \times 10^{-6} \text{ kgf/cm}^2$

For nickel-chrome-iron alloy:  $\alpha_2 = 12.5 \times 10^{-6}$  per  $^{\circ}\text{C}$  and  $E_2 = 2.2 \times 10^{-6} \text{ kgf/cm}^2$ .

\*\*\*\*\*