

N. B. : (1) Question No. 1 is **compulsory**.

- (2) Attempt any **four** questions out of remaining **six** questions.
 (3) Assume **suitable** data if **necessary** and state them **clearly**.
 (4) Figures to the **right** indicate **full** marks.

1. (a) Explain the principle of strain Gauge and derive an expression for gauge factor. What is Poisson's Ratio ? What is piezoresistance ? Explain the effect of Poisson's ratio and piezoresistance on metal and semiconductor strain gauges. **10**
- (b) Classify the displacement transducer. Explain in detail how variable capacitance transducer can be used for displacement measurement. Give proper circuit for the same. **10**
2. (a) Describe LVDT with construction and characteristic. Explain phase sensitive detectors in displacement measurement using LVDT with neat diagram. **10**
- (b) What are the different types of pressure sensors used in processing industry ? Explain with neat diagrams. **10**
3. (a) Explain the basic principle, construction of resistance thermometer. Give proper circuit for the measurement. **10**
- (b) State the basic principle for thermocouples type temperature measurements. Also describe basic laws for thermocouple circuits. **10**
4. (a) State the classification of flow-meters. Derive the expression for the fluid velocity from Bernoulli's theorem in head type flow meter. **10**
- (b) What are the different methods of torque measurement ? Explain in detail with diagram, any one method of torque measurement. **10**
5. (a) Explain with diagrams for analog multiplexed data acquisition system and digital multiplexed data acquisition system. Compare their advantages and disadvantages. **10**
- (b) Explain with neat diagrams the working of a Photodiode in photoconductive region and photovoltaic region. **10**
6. (a) Explain any one electrical method of differential pressure measurement. **10**
- (b) Describe the dynamic response of Second order instrument when subjected to a step input. Derive the output for under damped response. **10**
7. Write short notes on any **three** :— **20**
 - (a) Data logging system
 - (b) Ultrasonic flow meter
 - (c) Digital Accelerometer
 - (d) Static Characteristics of Instrumentation.