

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

(2) Attempt any **four** questions out of remaining **six** questions.

(3) Figures to the **right** indicate **full** marks.

1. (a) With the help of neat diagrams, explain phase sensitive detectors in displacement measurement using LVDT. Why are the phase sensitive detectors required? 10
- (b) Explain the basic principles of thermocouple type temperature measurements. Also explain the need for compensation for reference junction temperature. 10
2. (a) Explain two types of ultrasonic type flow measurement methods derivation and also the circuit/block for the same. 10
- (b) Explain with neat sketches, the working, construction, advantages and disadvantages of resistance thermometer. Give the signal conditioning circuit for measurement. 10
3. (a) Describe how strain is measured by using Wheatstone Bridge Circuits? Also discuss the strain balancing circuit. 10
- (b) Describe with proper signal conditioning amplifier stages for Piezoelectric Accelerometer. 10
4. (a) What are the different types of electrical pressure transducers? Explain with neat sketches, the construction and working. 10
- (b) Explain the principle of strain gauge and derive an expression for gauge factor. Also mention the names of the materials used for strain gauge manufacturing. 10
5. (a) Explain with neat diagrams the working of a photodiode in photoconductive region and photovoltaic region. 10
- (b) What are the different methods of torque measurement? Explain in detail with diagram any one method of torque measurement. 10
6. (a) Describe the Multi-channel Analog Multiplexed Data Acquisition System. State its merits and demerits over digital multiplexing Data Acquisition System. 10
- (b) Describe the dynamic response of second order instrument when subjected to a step input. Derive the output for underdamped response. 10
7. Write short notes on any **three** :— 20
 - (a) Classification of Transducers with one example of each.
 - (b) Temperature Measurement by Optical Pyrometer.
 - (c) Photomultiplier Tube.
 - (d) Virtual Instrumentation.
 - (e) Head Type Flow Meter.