Instructions: (1) All questions are compulsory.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Assume suitable data, if necessary.
(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

1. a) Attempt any three: 12
   i) Define the term, “Threshold” “Resolution”, “Repeatability” and “Reproducibility”.
   ii) Compare the term “Accuracy and Precision” (four points).
   iii) List low pressure measurement gauges and explain any one in detail.
   iv) Describe construction and working principle of “Bourden tube”.

   b) Attempt any one: 6
      i) Define transducer. Explain the classification of transducers with suitable example.
      ii) Draw neat sketch of RVDT, explain its working and state any two applications.

2. Attempt any two: 16
   a) Define error. Explain the detail classification of error.
   b) Draw a neat sketch of linear potentiometer for displacement measurement, explain its working. State any four applications of it.
   c) List the electrical and non-electrical method for temperature measurement. Explain with neat sketch liquid in glass thermometer.

3. Attempt any four: 16
   a) Describe construction and working principle of “Piezoelectric type pressure transducer”.
   b) A Wheatstone bridge requires a change of 7 Ω in the unknown arm of bridge, it produces a change in deflection of 3 mm of galvanometer. Determine the sensitivity and deflection factor.
   c) What is thermistor? Explain the working of a thermistor.
   d) Explain the seebeck and peltier effect.
   e) Explain radiation pyrometer with neat sketch.

P.T.O.
4. a) Attempt **any three**: 
   i) Explain the law of: 
      a) Intermediate temperature 
      b) Law of intermediate metal. 
   ii) Draw the labeled sketch of hot wire anemometer and explain its working. 
   iii) Explain the working of stroboscope with neat sketch. 
   iv) Draw and explain hair hygrometer for humidity measurement. 

b) Attempt **any one**: 
   i) Define with examples: 
      1) Automatic control system 
      2) Closed loop system 
      3) Open loop system. 
   ii) State different modes of control actions used in control systems and explain in brief ON-OFF controller. 

5. Attempt **any two**: 
   a) Define strain gauge. List the types of strain gauge. Explain the construction and working of bonded strain gauge with the help of diagram. 
   b) Compare the hydraulic, pneumatic and electronic control system (four points). 
   c) i) Draw and explain the measurement and control set up for speed control of a motor. 
      ii) What is servomotor mechanism? Explain its importance in control system. 

6. Attempt **any four**: 
   a) Explain the working of rotameter with the help of neat diagram. 
   b) How flow is measured by hot wire anemometer? 
   c) Explain the working of ultrasonic flow meter with a neat sketch. 
   d) Explain with neat sketch the working of capacitive transducer per liquid level measurement. 
   e) Explain with neat sketch the working of slipping clutch tachometer.