

**III B.Tech I Semester Supplementary Examinations, May 2005**  
**INSTRUMENTATION & CONTROL SYSTEMS**  
**( Common to Mechanical Engineering and Production Engineering)**  
**Time: 3 hours** **Max Marks: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. (a) Explain the following terms related to dynamic characteristics of an instrument
  - i. Speed of response and measuring lag
  - ii. Fidelity and dynamic error
  - iii. Dead time and dead zone
  - iv. Step, ramp and linear input functions(b) Define the following terms as applied to the dynamic response of measurement systems subjected to sinusoidal input
  - i. Frequency and circular frequency
  - ii. Undamped natural frequency, damped natural frequency and resonant frequency
  - iii. Phase shift and time delay
2. (a) Explain the difference in principle of operation of a photo-emissive cell, a photo-conductive cell and a photo voltaic cell. Give the applications of each of these cells.  
(b) Differentiate between null mode and deflection of operation of measurement systems with examples.
3. What are the types of pyrometers? Explain any one of them in detail with a neat diagram.
4. (a) Describe the construction and working of c-type, spiral type and helical type Bourdon gauges with neat diagrams.  
(b) Describe the construction, working and theory of a diaphragm type strain gauge transducer using four strain gauges. Describe how they are connected in a wheatstone bridge and what is the output obtained. List their advantages and disadvantages.
5. (a) List out the advantages and limitations of direct method of level measurement.  
(b) Describe with neat sketch the functioning of any two types of displacer type liquid level measuring instruments.
6. (a) How relative humidity is measured using hygrometer?  
(b) A seismic type accelerometer is relatively rugged compared to a seismic type vibrometer. Comment.

7. (a) Draw a neat sketch and explain the working of unbonded resistance type strain gauge.  
(b) Give the applications of unbonded strain gauges.  
(c) List the drawbacks of bonded type strain gauges.
8. (a) Describe the working of a system which automatically turns off the street lamps at dawn and turns on at dusk. Draw a schematic diagram of the system.  
(b) Draw the functional diagram of thermostat controlled home heating system and identify the system parameters and components. Describe the working of the system.

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