Code No: NR320302 **NR**

III B.Tech II Semester Supplementary Examinations, November/December 2005
INSTRUMENTATION AND CONTROL SYSTEMS
(Common to Mechanical Engineering, Mechatronics and Production Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Describe about the step response of second order system.
   (b) A response test on a thermometer was thrust into temperature controlled bath of water maintained at 100^0C and the time was observed as the indicated temperature reached preselected values giving the following readings.

Times(sec)	0.0	1.2	3.0	5.6	8.0	11.0	15.0	18.0
Temp(deg c)	20	40	60	80	90	95	98	99

   Draw the response curve on a graph paper and show that it follows closely the form of a simple lag with a time constant of 4 secs. [8+8]

2. (a) Describe the construction and working of a D.C. tachometer generator. Explain its advantages and disadvantages.
   (b) Explain the construction and working of a Flyball Tachometer. Discuss its merits and demerits. [16]

3. What is thermocouple? With a neat sketch explain its construction, working principle and applications. [16]

4. (a) Draw a neat sketch of an ionization gauge; explain the working principle of the gauge.
   (b) List merits and limitations of ionization gauges. [10+6]

5. (a) Explain the functioning of ultrasonic flow meter with a neat diagram.
   (b) With a neat diagram, explain the working of turbine flow meter and point out its limitations. [6+10]

6. (a) Explain the general theory of seismic instruments used for vibration/accelerator measurement.
   (b) Explain the working of a bonded strain gauge accelerometer with neat sketch. [8+8]

7. (a) Explain the method of measuring force using strain gauges.
   (b) Why bridge circuit is necessary for a strain gauge? Explain how the bridge circuit is used with a strain gauge. [8+8]

8. A common example of a two-input control system is a home shower with separate valves for hot and cold water. The objective is to obtain

   (a) a desired temperature of the shower water and

   (b) a desired flow of water

   Sketch a block diagram of the closed loop control system. Discuss the salient feature of this multivariable control system. [16]

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