Code No: RR220305 **Set No. 1**

II B.Tech II Semester Supplementary Examinations,
November/December 2005
INSTRUMENTATION AND 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) What do you mean by instrumentation? Write the objectives of instrumentation.
   (b) State and explain the desirable static and dynamic characteristics of an instrument. [16]
2. (a) Give the classification of inductive transducers indicating their principle.
   (b) Describe in detail the construction and working of an inductive and a capacitive transducers to measure linear displacement. [6+10]
3. With neat diagrams explain the construction, working principle of different types of pressure thermometers, compare them. [16]
4. (a) What is a differential pressure cell?
   (b) Elucidate the basic principle of operation of Mclead vacuum gauge with necessary diagram.
   (c) List the limitations of a Mclead vacuum gauge used to measure pressure. [4+8+4]
5. (a) List the various quantity flow meters and explain the working of a Nutating disk flow meter.
   (b) Give details of the magnetic flow meter and Ultrasonic flow meter. [16]
6. (a) What are the advantages of piezoelectric type accelerometer?
   (b) Name the different vibration sensing systems used in practice. Explain any one such system for the measurement of vibration. [8+8]
7. (a) Discuss the how bending can be measured using strain gauges.
   (b) Explain any one type of temperature compensation adopted in the above setup. [8+8]
8. Explain briefly the difference between.
   (a) open-loop and closed-loop control system.
   (b) positive and negative feed back.
   (c) servomechanism, process control and regulations. [16]

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Code No: RR220305 **Set No. 2**

II B.Tech II Semester Supplementary Examinations,
November/December 2005
INSTRUMENTATION AND 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) Discuss about the time response of first order system for
   i. Impulse input
   ii. Step input
   iii. Ramp input
   (b) Explain in detail about following terms:
   i. Speed of response
   ii. Measuring lag
   iii. Fidelity
   iv. Dynamic error [16]

2. (a) Give detailed classification of speed measuring devices with examples.
   (b) Write short note on Induction Sensors for speed measurement. [8+8]

3. (a) What are the different types of materials commonly used in thermisters?
   (b) Give the various forms of thermisters.
   (c) Explain the temperature-resistance relation of NTC thermister. [4+4+8]

4. (a) Explain, how an elastic diaphragm gauge is used to measure pressure with the help of relevant sketch.
   (b) List the limitations of elastic diaphragm gauge.
   (c) Discuss the merits and demerits of elastic sensing elements. [8+4+4]

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. [16]

6. (a) Explain the calibration procedure for an accelerometer.
   (b) What are the different methods of converting vibration into a voltage? Explain any on in detail. [8+8]

7. (a) Draw any four types of strain gauge arrangement for measuring strain.
   (b) How resistive strain gauges are calibrated? [8+8]

8. (a) Explain the operation of ordinary traffic signal. Why is the system called open loop? How can traffic be controlled more efficiently?

   (b) An ordinary floor furnace with manual control is an open loop control system. State the disadvantages of the open loop system. How may this be made an automatic closed loop system? Explain with the help of a block diagram. [16]

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Code No: RR220305 **Set No. 3**

II B.Tech II Semester Supplementary Examinations,
November/December 2005
INSTRUMENTATION AND 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) Measurement systems are classified frequently as first order or second order systems. Explain the meaning of terminology.
   (b) A thermometer has been suddenly plunged into a steaming water bath whose temperature remains steady at 100^oC. It takes 10 seconds for the thermometer to reach the equilibrium condition which occurs at five time constants ($t = 5\tau$). Calculate the time constant and the time taken by the thermometer to indicate half of the temperature difference. The initial thermometer temperature can be considered to be zero. [16]

2. (a) How the ionization transducer is used to measure displacement? Explain the same.
   (b) Discuss in detail about the concept of photoelectric transducer for measuring displacement. [16]

3. (a) What are the different types of materials commonly used in thermisters?
   (b) Give the various forms of thermisters.
   (c) Explain the temperature-resistance relation of NTC thermister. [4+4+8]

4. (a) Differentiate between Atmospheric pressure and Gauge pressure and Vacuum.
   (b) With the aid of neat sketches, explain the principle of operation of various. [16]

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. [16]

6. (a) Explain how a vibrometer is calibrated to measure acceleration.
   (b) How is measurement of vibrations on large structures done? Explain the method in detail. [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) Explain the operation of ordinary traffic signal. Why is the system called open loop? How can traffic be controlled more efficiently?

   (b) An ordinary floor furnace with manual control is an open loop control system. State the disadvantages of the open loop system. How may this be made an automatic closed loop system? Explain with the help of a block diagram. [16]

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Code No: RR220305 **Set No. 4**

II B.Tech II Semester Supplementary Examinations,
November/December 2005
INSTRUMENTATION AND 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) Write the classification of errors.
   (b) What is a transducer? State the factors on which transducer selection depends.
   (c) Distinguish between active and passive transducers with suitable examples. [4+8+4]

2. (a) Explain the construction and working of an A.C. Tachometer generator. Describe its limitations.
   (b) Explain the construction, working of a photoelectric tachometer. Explain its advantages and disadvantages. [16]

3. (a) What are the different types of materials commonly used in thermisters?
   (b) Give the various forms of thermisters.
   (c) Explain the temperature-resistance relation of NTC thermister. [4+4+8]

4. (a) What is a differential pressure cell?
   (b) Elucidate the basic principle of operation of Mclead vacuum gauge with necessary diagram.
   (c) List the limitations of a Mclead vacuum gauge used to measure pressure. [4+8+4]

5. (a) List the various quantity flow meters and explain the working of a Nutating disk flow meter.
   (b) Give details of the magnetic flow meter and Ultrasonic flow meter. [16]

6. (a) Compare the working of a servo and digital accelerometers.
   (b) Name the different types of hygrometers used for measuring humidity. [16]

7. (a) Name the different types of strain gauges used in practice and explain how the selection of a strain gauge affect the measurement of strain.
   (b) How resistive strain gauges are calibrated? [8+8]

8. (a) With the help of block diagrams explain the functions of all the ingredients of a bathroom toilet tank control system.
   (b) Describe the control system used for steering antenna. Explain its control variables and the servomechanism. [16]

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