Code No: R5212205 **R5**

II B.Tech I Semester(R05) Supplementary Examinations, May/June 2010
SENSORS AND SIGNALS CONDITIONING
(Instrumentation & Control Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain with a block diagram an instrumentation system and explain the function of various blocks.
   (b) The dead-zone of a certain pyrometer is 0.125 percent of the span. The calibration is 800°C 1800°C. What temperature change must occur before it is detected? [8+8]

2. (a) Describe in brief two types of wire wound strain gauges mentioning their typical size, resistance, maximum excitation voltage, and construction material.
   (b) The resistance of a strain gauge is 120 ohm and $G_f = 2$. It is connected to a current sensitive Wheatstone bridge in which resistance on all arms is 120 ohm. If the input voltage is 4V and the resistance of the galvanometer is 100 ohm, calculate the detector current in μA for μ strain.[8+8]

3. (a) How does the use of micro processor be useful in bridge circuits?
   (b) A resistance of approximate value of 80Ω is to be measured by voltmeter-ammeter method using a 1 A ammeter having a resistance of 2Ω and 50 V voltmeter having a resistance of 5000Ω.
      i. Suggest which one of the two methods should be used?
      ii. Supposing in the suggested method the following measurements are made : I = 0.42 A and V = 35.5 V What is the resulting error if the accuracy of the instruments is ±0.5% at full scale and the errors are standard derivations. [6+10]

4. (a) Explain how moisture content in grain can be measured by means of a capacitive transducer.
   (b) Explain the working principle and construction of Hall effect transducer. [8+8]

5. (a) Explain the working of resonance bridge and write an expression for resonance frequency.
   (b) With the help of suitable example explain the variable Oscillator and its applications. [8+8]

6. (a) The voltage sensitivity for barium titanate is 12×10^{-2} Vm/N while that of quartz is 50×10^{-12} Vm/N. The permitivity of barium titanate is 12.5×10^{-9} F/m an that of quartz is 40.6×10^{-12} F/m. Calculate the charge sensitivities and their ratio.
   (b) Show how a thermocouple can be used as temperature transducer. [8+8]

7. (a) With a schematic diagram, explain the operation of Instrumentation amplifier.
   (b) List the characteristics of Instrumentation amplifier. [10+6]

8. (a) Explain the principle and operation of surface mount strain gauge. Give its applications.
   (b) Write short notes on magneto diodes. [8+8]

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