

**FACULTY OF INFORMATICS**

B.E. 4/4 (IT) I-Semester (**Supplementary**) Examination, June / July 2011

Subject : **Digital Instrumentation and Control** (Elective – II)

Time : 3 Hours

Max. Marks: 75

**Note:** Answer all questions from Part-A and answer any **Five** questions from Part-B.

**PART - A** (25 Marks)

1. Differentiate between analog signal conditioning and digital signal conditioning. 3
2. List motion sensors. 2
3. Briefly explain thermistor characteristics. 3
4. What is an actuator? Give two examples. 2
5. List design considerations in controller design. 3
6. Give use of op-amps in instrumentation and control. 3
7. How step response differs from ramp response? 2
8. What are the continuous and discontinuous modes of a controller? 2
9. What is control loop stability? 2
10. What is an interlocking system? Explain. 3

**PART - B** (50 Marks)

- 11.a) Give an op-amp circuit for signal amplification in instrumentation and explain. 5
- b) With the help of diagram explain the operation of A/D conversion. 5
- 12.a) Briefly explain semiconductor strain gauges. 6
- b) A strain gauge with a gauge factor of 2.03 is used in a wheatstone bridge circuit with resistances of 350 ohms in two arms. The third arm consists of a dummy strain gauge and the fourth arm an active strain gauge, both with a nominal resistance of 350 ohms. If a strain of 1450 micro meters/ meter is applied, find the offset voltage of the bridge if a voltage of 10 volts is used as the source. 4
13. Explain the working operation of a photo emitter-detector pair in detail. 10
- 14.a) Explain the working of pneumatic actuator clearly with neat diagram. 5
- b) Explain about the step-response of a second-order system. 5

- 15.a) Explain the working of a programmable logic controller. 6
- b) What is a discrete process control system? What are its desirable characteristics? 4
- 16.a) Explain the operation of a successive approximation type ADC with an Example of 8-bits and 5-volts. 5
- b) Explain how a voltage ladder diagram is developed for simple control problems. 5
17. Write notes on the following :
- a) Thermal sensors 5
- b) PID controller 5
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