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Question Paper Code : 21429

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Sixth Semester

Electronics and Instrumentation Engineering

EI 2352/EI 62/10133 EI 602 – PROCESS CONTROL

(Common to Instrumentation and Control Engineering)

(Regulation 2008/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the need for process control?
2. A self regulatory system does not require a controller. True/False. Justify the answer.
3. List the advantages and disadvantages of integral and derivative action, in a PID controller.
4. What is single speed floating control?
5. What is controller tuning?
6. Why gain margin and phase margin are to be considered, while tuning a controller?
7. How to select secondary controller in a cascade control scheme?
8. Identify the input and output variables of distillation column.
9. Why installed characteristics of a control valve differ from inherent characteristics.
10. What is the function of an positioner in the actuator?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Illustrate servo and regulatory operation with an example for each. (8)
(ii) Explain continuous and batch process with an example. (8)

Or

- (b) Obtain the mathematical model of a simple first order thermal and level processes. (16)
12. (a) (i) Obtain the response of P,I,D controller for a step change in input. (6)
(ii) Illustrate the need and benefit of each component of composite PID controller. (10)

Or

- (b) (i) Design an electronic PI controller with proportional gain = 10 & integral gain = $0.1S^{-1}$ (8)
(ii) With a neat block diagram, explain the functioning of a pneumatic PID controller. (8)
13. (a) (i) What is the use of evaluation criteria? Explain IAE, ISE, ITAE and $\frac{1}{4}$ decay ratio criterias. (8)
(ii) Explain frequency response method of controller tuning. (8)

Or

- (b) Explain the process reaction curve method and Ziegler Nichol's method of tuning a controller. (16)
14. (a) (i) Explain control of a heat exchanger, using feed forward control. (8)
(ii) What is split range control? Explain with a simple example. (8)

Or

- (b) (i) Explain issues involved in multivariable control. (8)
(ii) Explain control of boiler, using three element method. (8)

15. (a) (i) With a neat diagram, explain the functioning of a valve positioner. What are the advantages of using the same? (10)
- (ii) Explain the working of a simple current to pressure converter, with a neat diagram. (6)

Or

- (b) (i) Explain cavitation and flashing in control valves. (6)
- (ii) Explain sizing of control valves. (10)
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