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**Question Paper Code : 21536**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015

Sixth Semester

Electronics and Instrumentation Engineering

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

(Common to Instrumentation and Control Engineering)

(Regulations 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. Define neutral zone with respect to on-off controller.
4. What are the effects of PI controller?
5. How is evaluation criteria useful?
6. What is optimum controller settings?
7. What is the need for inferential controller?
8. Give the logic used for the implementation of ratio control.
9. State the characteristics of control valves.
10. Compare pneumatic and electric actuators.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Obtain the mathematical model of first order thermal process. (10)  
 (ii) For the above thermal process, identify the process variables including, the disturbance - variable and obtain the degrees of freedom of the process. (6)

Or

- (b) (i) Obtain the mathematical model of a first order pneumatic process. (10)  
 (ii) How is servo control different from regulatory control? Give examples. Can PID controller be used for both control types? Justify. (6)
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

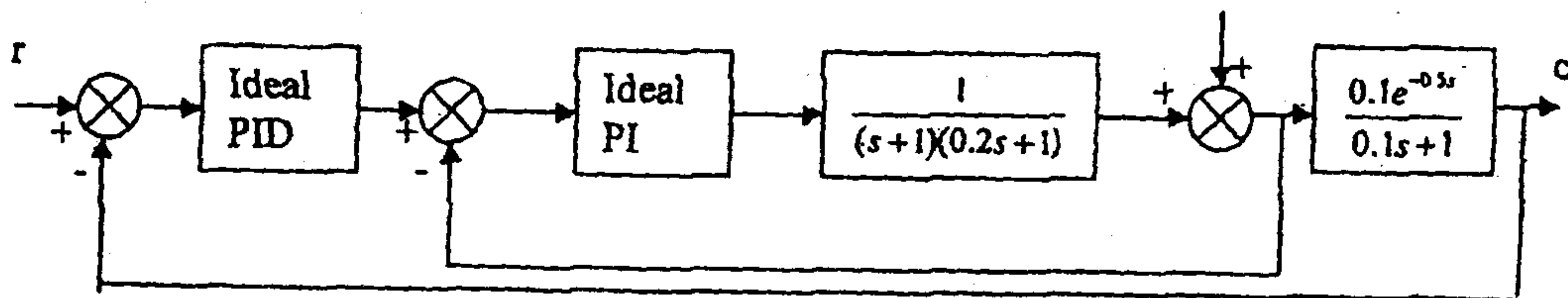
- (b) (i) Design an electronic PI controller with proportional gain = 10 and integral gain  $0.1S^{-1}$  (8)  
 (ii) With a neat block diagram, explain the functioning of a pneumatic PID controller. (8)
13. (a) (i) Discuss damped oscillation method. (8)  
 (ii) Explain the basis behind the selection of type of controller for various processes. (8)

Or

- (b) (i) Explain the process of tuning feedback controller using process reaction curve method. (8)  
 (ii) Explain ISE and IAE. (8)
14. (a) Explain the feed forward control with an example. Compare feed forward controller with feed back controller. Also bring out its merits and demerits.

Or

- (b) An oil fired furnace is controlled by a cascade control system where the inner loop regulates the flow of oil. The inner process is approximated by a first order one having a lag of 2 sec in which loop measurement lag is 0.5 sec. Assuming the lag to be zero and the outer process lag to be 5 sec, obtain the controller parameters for effectively controlling the process. The outer loop measurement lag is zero. Compare your results with the case when the cascade control is not used.



15. (a) (i) With a neat circuit diagram, explain the I/P converter. (6)  
(ii) With the necessary diagram, explain the characteristics of control valves. (10)

Or

- (b) Explain the procedure for control valve sizing for a flow control system. (16)