A   **Reg. No. :**

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Question Paper Code: 56503

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B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

Sixth Semester

Electronics and Instrumentation Engineering

15UEI603-PROCESS CONTROL

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Which of the following are the dynamic characteristics of an   CO1- R
    instrument?

    (a) Reproducibility   (b) Sensitivity   (c) Dead zone   (d) Fidelity

2. Thermocouple in a thermal well behaves as a true   CO1- R

    (a) first order system   (b) multiple first order system

    (c) second order system (overdamped)   (d) second order system (underdamped)

3. What type of controller is displayed by the equation below?   CO2- App

    $c(t) = K_c[e(t) + \frac{1}{T_i} \int e(t)dt]$

    (a) Feed forward   (b) Derivative   (c) PID   (d)   Proportional
                                                                                Integral

4. _____ controller is an example of discontinuous controller mode   CO2- U

    (a) Proportional control   (b) Integral control

    (c) Derivative control   (d) ON/OFF control

5. _____Control is the satisfactory control for temperature process   CO3- U

    (a) PID   (b) PI   (c) PD   (d) P

6. Use of *I*-control along with *P*-control facilitates   CO3- R

   (a) elimination of offset   (b) reduction of offset

   (c) reduction of stability time   (d) none of these

7. The phenomenon of cavitation is related to _____   CO4- R

   (a) Pascal law   (b) Bernouli's theorem   (c) Newton's law   (d) Hooks law

8. In Electro-Pneumatic Direction control valves the actuation is done   CO4- R
   by which of the following?

   (a) Lever   (b) Push button   (c) Solenoid   (d) Relay

9. The control configuration with primary loop and secondary loop is   CO5- R
   known as _____

   (a) Cascade control   (b) Split range control

   (c) Ratio control   (d) Feed forward control

10. Control valve sizing depends on   CO5- R

    (a) Cv factor   (b) Flow rate   (c) Fluid property   (d) Line pressure

PART – B (5 x 2= 10Marks)

11. Differentiate between batch process and continuous process.   CO1- U

12. Draw the circuit for electronic PI controller.   CO2- U

13. What are the parameters required to design a best controller?   CO3- U

14. List any two special control valves.   CO4- R

15. Show the advantage of cascade control over conventional control   CO5- R

PART – C (5 x 16= 80Marks)

16. (a) Derive the transfer function for interactive capacities of two   CO1- App   (16)
         tank system

                              Or

    (b) Describe a simple thermal system in which incoming liquid is   CO1- U   (16)
         heated by the heater in the tank and going out with higher
         temperature. Develop first order transfer function of the
         thermal process.

17. (a) Describe the characteristics of P, PI and PID modes of   CO2- App   (16)
         controller.

                              Or

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(b)   (i) Illustrate the need and benefit of each component of composite PID controller.   CO2- U   (8)

(ii) Draw and explain pneumatic proportional controller.   CO2- U   (8)

18. (a) Discuss the controller settings using Ziegler-Nichols continuous cycling method and write its limitations.   CO3- U   (16)

Or

(b) Explain process reaction curve method & damped oscillation method   CO3- Ana   (16)

19. (a) Explain the operation of pneumatic actuators with and without valve positioner   CO4- U   (16)

Or

(b) (i) Illustrate the inherent and installed characteristics of control valve   CO4-U   (8)

(ii) Summarize the factors to be considered before the selection of control valve for a given application.   CO4-U   (8)

20. (a) (i) Explain the concept of ratio control with an example   CO5- U   (8)

(ii) What is split range control? Describe a situation when you could use split range control   CO5- U   (8)

Or

(b) Illustrate the operation of split range controller and inferential controller.   CO5- U   (16)

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