Question Paper Code: 96902

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

Sixth Semester

Chemical Engineering

19UCH602 – PROCESS INSTRUMENTATION DYNAMICS & CONTROL

(Regulations 2019)

Duration: Three hours   Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. A process control system consists of   CO1- R

    (a) 2 elements   (b) 4 elements   (c) 6 elements   (d)10 elements

2. What is a process control system?   CO1- R

    (a) System to check the voltage

    (b) System to keep the parameters at highest value

    (c) System to maintain the parameters constant

    (d) System to keep the parameters at zero value

3. The system with the open loop transfer function $1/s(1+s)$ is: CO1- R

    (a) Type 2 and order 1   (b)Type 1 and order 1

    (c)Type 0 and order 0   (d) Type 1 and order 2

4. In a stable control system backlash can cause which of the following?   CO1- U

    (a) Under damping   (b)Over damping

     (c)Poor stability at reduced values of open loop gain   (d) Low-level oscillations

5. A control system in which the control action is somehow dependent   CO1- U
    on the output is known as

    (a) Closed loop system   (b) Semi closed loop system

    (c) Open system   (d) Non feedback control system

6. What is the value of steady state error in closed loop control systems?　　　　CO1- U

   (a) Zero　　　　　(b)Unity　　　　　(c) Infinity　　(d) Unpredictable

7. For a stable closed loop system, the gain at phase crossover frequency should always be:　　　　CO1- U

   (a) < 20 dB　　　　(b) < 6 dB　　　(c) > 6 dB　　　　　　(d) > 0 dB

8. For Nyquist contour, the size of radius is _____　　　　CO1- U

   (a) 25　　　　(b) 0　　　　　(c) 1　　　　　(d) ∞

9. In a control system the output of the controller is given to　　　　CO1- U

   (a) Amplifier　　(b)Sensor　　　(c)Final control element　(d) Comparator

10. Regenerative feed forward implies feedback with　　　　CO1- U

    (a) Oscillations　　(b)Step input　　　(c)Negative sign　　(d) Positive sign

PART – B (5x 2= 10 Marks)

11. What are the Four steps of the mathematical modeling process?　　　　CO1- U

12. What is lead lag control system?　　　　CO1- R

13. What are the principles of electronic controller?　　　　CO1- U

14. What is the importance of frequency response?　　　　CO1- R

15. What is the importance of control system?　　　　CO1- U

PART C - (5 x 16 = 80 Marks)

16. (a) Discuss briefly about the Formulating Process Models.　　　CO1 -U　　(16)

    Or

    (b) Transform the following equation and obtain the ratio of output to　CO2- App　(16)
    input, $Y(s)/X(s)$:
    $$4.d2y/dt2 + 2.dy/dt+ 3.y=5x$$

17. (a) Elaborate about the linearization and its application in process control.　　CO1 -U　　(16)

    Or

    (b) A Proportional controller having gain kc is used to control two　CO2 -App　(16)
    non-interacting liquid level tanks having time constants T=1 &
    T=0.5.for unity feedback control system. Determine stability of
    system using routh criterion.

18. (a) Describe briefly about the Closed loop control systems   CO1- U   (16)

Or

   (b) The transfer function of a negative feedback control system is given as: CO2- App   (16)

$$G(s) = Kce^{-0.4s}/(s+1)(s+0.5)$$

Find the root locus.

19. (a) Describe briefly about the control system design by frequency response techniques.   CO1 -U   (16)

Or

   (b) Derive briefly about the Nyquist Stability Criterion with her expression.   CO1 -U   (16)

20. (a) Explain briefly about the introduction to computer control of chemical processes.   CO1- U   (16)

Or

   (b) Describe about the Inverse response of smith predictor controller.   CO1- U   (16)

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