Reg. No.												

Question Paper Code	11928

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023

Fifth Semester

Instrumentation and Control Engineering

(Common to Electronics and Instrumentation Engineering)

20ICPC501 - PROCESS CONTROL

(Regulations 2020)

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

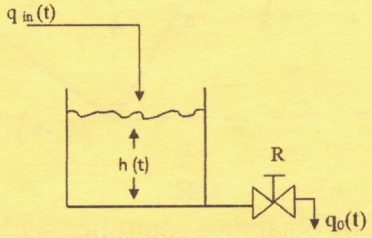
Answer ALL Questions

		Marks, K-Level, CO
1.	Define P&I diagram.	*2,K1,CO1*
2.	Compare lumped and distributed parameter model system.	*2,K2,CO1*
3.	Define actuator.	*2,K1,CO1*
4.	Why installed characteristics of control valve does not matches with its inherent characteristics.	*2,K2,CO1*
5.	Define neutral zone in ON-OFF controller.	*2,K1,CO1*
6.	List the disadvantages of proportional controller.	*2,K1,CO1*
7.	Define tuning of controllers.	*2,K1,CO1*
8.	Compare feed-forward control and feed-back control.	*2,K2,CO1*
9.	Define non invertible term in internal model controller.	*2,K1,CO1*
10.	List the parameters that are monitored to control liquid level in boiler drum using three element drum level control.	*2,K1,CO1*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Derive the mathematical model of simple liquid level system shown in figure. *13,K2,CO1*



OR

b) Give the mathematical model of simple thermal process when the contents of the tank are heated by heater with neat diagram and also mention the assumptions that have been made to derive the mathematical model of the system. *13,K2,CO1*

12. a) Discuss in detail about cavitation and flashing in control valve with necessary diagram and methods to avoid them *13,K2,CO2*

OR

b) Discuss in detail about the points to consider while selecting control valve for particular applications. *13,K2,CO2*

13. a) Explain the following control modes. *13,K2,CO1*
(i) Proportional mode.
(ii) P+I mode.

OR

b) An integral control system have a measurement range of (0.4 to 2) Volts. The output range is of (0 to 6.8) Volts. Design an operational amplifier based integral control to implement the gain of 4% / (%-min). *13,K3,CO1*

14. a) Explain Ziegler-Nichols continuous cycling method of controller tuning with neat diagram also list its advantages and disadvantages. *13,K2,CO1*

OR

b) Explain in detail about the construction working of cascade control system with necessary diagram. *13,K2,CO1*

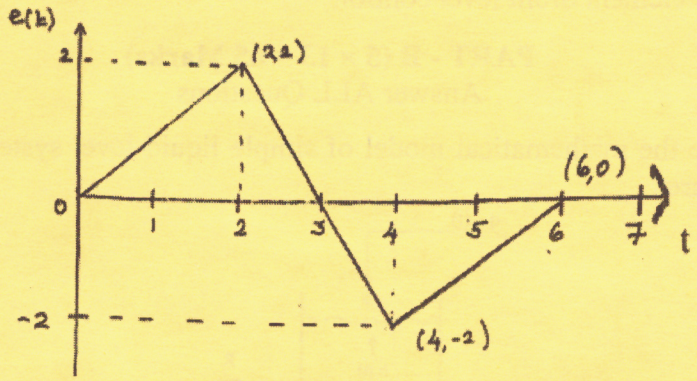
15. a) Discuss in detail about IMC controller and its design with suitable example. *13,K2,CO1*

OR

b) Explain three element drum level control with neat schematic diagram also list its advantages and disadvantages. *13,K2,CO1*

PART - C (1 × 15 = 15 Marks

16. a) Plot the response of proportional controller that has gain value $K_P = 2$ for the error signal shown below having $P_0 = 50\%$. *15,K3,CO3*



OR

b) Discuss the process of obtaining controller settings using Cohen-coon tuning method and also find the controller setting for PI mode of control action using Cohen-Coon method for the system model given by $G_{MDL}(S) = \frac{2.3}{4S+1} e^{-0.5S}$ *15,K3,CO4*