Reg. No.															

Question Paper Code	12883

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Fifth Semester

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.	Write the mathematical model representation of pressure process.	2	K1	CO1
2.	Sketch the Heat exchanger feedback control.	2	K2	CO1
3.	Give the functions of an actuator and list different types of actuators.	2	K2	CO2
4.	Why installed characteristics of a control valve are different from inherent characteristics?	2	K2	CO2
5.	Conclude why derivative mode of control is not recommended for a noisy process?	2	K1	CO3
6.	Compare P, l and D controller.	2	K2	CO3
7.	Distinguish between IAE and ISE.	2	K2	CO4
8.	List the advantages of cascade control over conventional control.	2	K2	CO4
9.	Summarize the final Smith Predictor Control system diagram.	2	K2	CO5
10.	Define IMC controller and multi variable control.	2	K1	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

			Marks	K – Level	CO
11.	a)	i) Explain the distinction between servo and regulatory operations, using an appropriate example to illustrate.	7	K2	CO1
		ii) Clarify the dissimilarity between interacting and non-interacting processes, providing relevant examples for better understanding.	6	K2	CO1
		OR			
	b)	Explore the principles and levels associated with process control and derive the mathematical model of a flow process.	13	K2	CO1
12.	a)	Provide the flow equation for an equal percentage valve and illustrate its inherent valve characteristics through a sketch.	13	K2	CO2
		OR			
	b)	Define cavitations and flashing in control valves and outline methods for prevention.	13	K2	CO2

13. a) A PI controller has proportional band of 20% and integral time of 10seconds. For a constant error of 5%. Evaluate the controller output after 10 seconds. The controller offset is 25%. *13 K2 CO3*

OR

b) Discuss the need and benefit of each mode of composite PID controller with suitable illustration. *13 K2 CO3*

14. a) Design and describe the process reaction curve method and explain how to arrive at optimum controller setting for P, PI and PID controllers using any one tuning criteria. *13 K3 CO4*

OR

b) Examine the process of configuring controller parameters through the frequency response method. *13 K3 CO4*

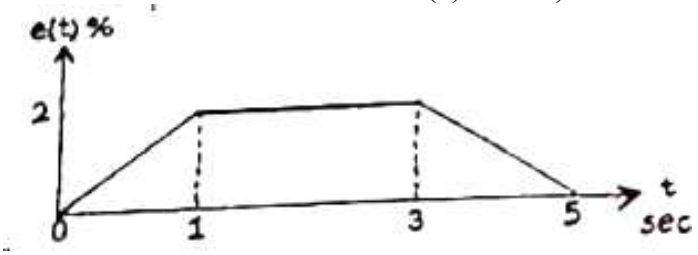
15. a) Elaborate on the Internal Model Control (IMC) design procedure, including the essential equations involved. *13 K2 CO5*

OR

b) Contrast the feedback + feed forward and Cascade control schemes for heat exchanger control. Provide a loop schematic and enumerate the advantages and disadvantages of each scheme. *13 K2 CO5*

PART - C (1 × 15 = 15 Marks)

16. a) Draw the plot of PID controller output for the following error pattern. (Kp =5. τI = 1 sec and τD= 0.5 sec and Ps(0) = 10%). *15 K2 CO3*



OR

b) i) Describe the practical parallel forms of a PID controller at an applied level. *8 K2 CO3*

ii) Tabulate the key characteristics of commercial PID Controllers. *7 K2 CO3*