Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V (NEW) EXAMINATION – WINTER 2020

Subject Code:2151705 **Date:03/02/2021**

Subject Name:Process Control Systems

Time:10:30 AM TO 12:30 PM **Total Marks: 56**

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Briefly discuss servo control and regulatory control problems.	**03**
	(b)	Define the terms: (1) manipulated variable (2) controlled variable (3) transfer function (4) offset	**04**
	(c)	Explain linearization method for processes with nonlinear elements.	**07**
Q.2	**(a)**	Write down mass balance equation for a single tank liquid level system.	**03**
	(b)	Differentiate between self regulating and non self regulating processes.	**04**
	(c)	Derive mathematical model of continuous stirred tank reactor.	**07**
Q.3	**(a)**	What do you mean by the term ‘Dead Time’? What is its effect on the stability of system?	**03**
	(b)	Derive and discuss unit step response of integrating process.	**04**
	(c)	Discuss in detail the process reaction curve method to obtain FOPDT model of a process.	**07**
Q.4	**(a)**	Draw and explain step response of PI controller.	**03**
	(b)	Briefly explain inverse response process with an example.	**04**
	(c)	Discuss two position control mode with suitable example. Discuss the significance of neutral zone.	**07**
Q.5	**(a)**	Discuss Zero Order Hold (ZOH) in the context of digital controller.	**03**
	(b)	Define the term ‘proportional band’ with suitable example. Discuss its effect on system stability.	**04**
	(c)	Discuss closed loop Zeigler Nichols tuning method of PID controller.	**07**
Q.6	**(a)**	What is integral wind up?	**03**
	(b)	Explain any one anti wind up technique.	**04**
	(c)	With necessary circuit and equations, discuss the electronic design of PID controller using operational amplifiers.	**07**
Q.7	**(a)**	What is inferential control? Explain briefly.	**03**
	(b)	Explain adaptive control briefly.	**04**
	(c)	Discuss feed forward and feedback control schemes with suitable diagram and their advantages and disadvantages.	**07**
Q.8	**(a)**	Briefly explain selective control scheme.	**03**
	(b)	Discuss cascade control scheme with suitable diagram.	**04**
	(c)	With suitable diagram explain the control scheme for maintaining proper air to fuel ratio for drum boilers.	**07**

****