Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 7 – EXAMINATION – SUMMER 2026

Subject Code: 3171710 **Date: 29/05/2026**

Subject Name: Process Dynamics And Control

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Discuss the need of mathematical model for process system.	**03**
	(b)	Explain the dynamic behavior of second order system with necessary diagram with deriving associated equation.	**04**
	(c)	Develop a mathematical model for CSTR. Comments on results.	**07**
Q.2	**(a)**	What are shrinking and swelling effects in boiler?	**03**
	(b)	Write short note on sequential control in batch process.	**04**
	(c)	Compare control schemes for heat exchanger. Explain any one scheme in detail.	**07**
		OR	
Q.2	**(c)**	Compare two and three element level control for boiler.	**07**
Q.3	**(a)**	Draw temperature control of chemical reactor.	**03**
	(b)	Enlist two major importance of burner management system. Explain burner management system for boilers.	**04**
	(c)	Draw and explain cascade control scheme of heat exchanger.	**07**
		OR	
Q.3	**(a)**	Explain the basic interlocks for safe operation of boiler	**03**
	(b)	Compare batch, continuous and packed-bed reactors.	**04**
	(c)	Explain basic unit operations for sugar industries with suitable process flow diagram.	**07**
Q.4	**(a)**	Explain pH control for chemical reactors.	**03**
	(b)	Explain basic material balance control schemes for distillation column.	**04**
	(c)	Explain basic unit operations for petrochemical industry with suitable process flow diagram.	**07**
		OR	
Q.4	**(a)**	Explain the pressure control schemes for distillation columns.	**03**
	(b)	Explain distillate reflux flow control for distillation column.	**04**
	(c)	Explain the unit operations of pharma industry with suitable process flow diagram.	**07**
Q.5	**(a)**	What is measurement lag? How does it affect response of the system?	**03**
	(b)	What is frequency response for distillation column? Explain importance of it with necessary equations.	**04**

	(c)	Explain the unit operations of paper industry with suitable process flow diagram	**07**

OR

Q.5	**(a)**	Define time constant. With suitable example, explain dynamics of first order system	**03**
	(b)	Explain in brief overhead composition control in distillation column.	**04**
	(c)	Explain basic unit operations for fertilizer industries with suitable process flow diagram.	**07**

*****