

# GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VII (New) EXAMINATION – WINTER 2019

**Subject Code: 2171710**
**Date: 03/12/2019**
**Subject Name: Process Dynamics and Control**
**Time: 10:30 AM TO 01:00 PM**
**Total Marks: 70**
**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
<b>Q.1</b>	(a) Briefly explain shrinking and swelling effects in boiler.	<b>03</b>
	(b) Derive mathematical model for first order system.	<b>04</b>
	(c) Explain the unit operations used in food and pharmaceutical Industries with suitable process flow diagram.	<b>07</b>
<b>Q.2</b>	(a) Explain column pressure control in distillation column	<b>03</b>
	(b) Explain measurement lag. Narrate various installation techniques of thermocouple in well.	<b>04</b>
	(c) Explain three element control strategy for boiler. Discuss its advantages over single and two element control strategies.	<b>07</b>
	<b>OR</b>	
	(c) Explain dynamic response of heat exchanger to change in steam temperature	<b>07</b>
<b>Q.3</b>	(a) Derive mathematical model for thermocouple without thermo well.	<b>03</b>
	(b) Enlist two major importance of burner management system. Explain burner management system for boilers.	<b>04</b>
	(c) What is frequency response for distillation column? Explain importance of it with necessary equations.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) What is inverse response? Explain with reference to boiler.	<b>03</b>
	(b) Compare batch, continuous and packed-bed reactors.	<b>04</b>
	(c) Discuss different control schemes for heat exchanger.	<b>07</b>
<b>Q.4</b>	(a) Compare batch process and continuous process with its applications.	<b>03</b>
	(b) Write short note on sequential control in batch process	<b>04</b>
	(c) Discuss different design aspects for waste water treatment plant	<b>07</b>
	<b>OR</b>	
<b>Q.4</b>	(a) Write a brief note on countercurrent exchangers.	<b>03</b>
	(b) Explain dynamic behavior of second order linear system.	<b>04</b>
	(c) Explain the unit operations of fertilizer industry with suitable process flow diagram	<b>07</b>
<b>Q.5</b>	(a) Discuss pH control for chemical reactors in brief.	<b>03</b>
	(b) Discuss mass and energy balance in distillation column with necessary equation.	<b>04</b>
	(c) Discuss various direct and indirect methods of controlling overhead composition in a distillation column.	<b>07</b>
	<b>OR</b>	
<b>Q.5</b>	(a) Explain system identification with one example.	<b>03</b>
	(b) Draw and explain diagram of feed forward control of feed water in boiler.	<b>04</b>
	(c) Explain basic flow chart of unit operations of paper industries.	<b>07</b>

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