

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2022****Subject Code:3171710****Date:10-01-2023****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.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) What is the difference between model and actual plant.	03
	(b) Derive the empirical mathematical model for second order RC network.	04
	(c) What is non linearity in control system. Describe the dynamic behavior of the nonlinear first order system.	07
Q.2	(a) What are shrinking and swelling effects in boiler? Explain it.	03
	(b) How to design a PID control using Z-N tuning rule and a first order model of a system.	04
	(c) Discuss different control schemes for heat exchanger.	07
OR		
	(c) Explain dynamic response of heat exchanger to change in steam temperature.	07
Q.3	(a) Explain stability of reactor and effects of lag.	03
	(b) Compare two and three element level control for boiler.	04
	(c) Explain with the help of steady state model, the variables that fix the distillation operation.	07
OR		
Q.3	(a) List the types of pumps.	03
	(b) Compare batch, continuous and packed-bed reactors.	04
	(c) What is end point detection? Explain end point detection for continuous and batch reactor.	07
Q.4	(a) What is inverse response? Explain with respect to boiler.	03
	(b) Draw temperature control of chemical reactor.	04
	(c) What is frequency response for distillation column? Explain importance of it with necessary equations.	07
OR		
Q.4	(a) Illustrate pH control for chemical reactors in brief.	03
	(b) Write short note on distillate reflux flow control.	04
	(c) Discuss various direct and indirect methods of controlling overhead composition in a distillation column.	07
Q.5	(a) Draw block diagram of process of pharma Industry.	03
	(b) Write short note on sequential control in batch process.	04
	(c) Discuss the importance of system identification for petrochemical and fertilizer industries.	07
OR		
Q.5	(a) Write a brief note on countercurrent exchangers.	03
	(b) Define optimization and need of it.	04
	(c) Explain the unit operations of sugar industry with suitable process flow diagram.	07
