Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2023

Subject Code:3154402 Date:15-12-2023

Subject Name:Chemical Reaction Engineering - I

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)**	Define moleculartiy, order of reaction and rate constant K. State the general unit for rate constant K.	**03**
	(b)	Differentiate between Elementary and Non Elementary reactions with suitable examples.	**04**
	(c)	Give classification of chemical reactions and discuss variables affecting the rate of reaction.	**07**
Q.2	**(a)**	Discuss in detail about Half life Method.	**03**
	(b)	Differentiate constant volume and Variable volume batch reactor.	**04**
	(c)	State various theories of temperature dependency and discuss Arrhenius theory in detail.	**07**
		OR	
	(c)	Differentiate between Integral and Differential method for analysis for finding order of reaction.	**07**
Q.3	**(a)**	Give comparison for mixed flow reactor Vs. plug flow reactor.	**03**
	(b)	Derive the design equation of ideal batch reactor.	**04**
	(c)	Mention the use of recycle reactor and derive the design equation for the same.	**07**
		OR	
Q.3	**(a)**	Discuss autocatalytic reactor.	**03**
	(b)	Derive the performance equation of ideal Plug flow reactor.	**04**
	(c)	Compare volume of PFR and CSTR for 1st order reaction.	**07**
Q.4	**(a)**	Give examples for series, parallel and autocatalytic reactions.	**03**
	(b)	Explain Plug Flow Reactors in Series and in Parallel with equation.	**04**
	(c)	Derive the performance equation for equal size CSTR's arranged in parallel.	**07**
		OR	
Q.4	**(a)**	Derive the design equation for plug flow reactors connected in parallel.	**03**
	(b)	Draw the equilibrium conversion v/s temperature profile for reversible exothermic and endothermic reaction.	**04**
	(c)	Write a short note on optimum temperature progression.	**07**
Q.5	**(a)**	Write a short note on 'heat of reaction from thermodynamics' .	**03**
	(b)	Explain E, F, & C curves.	**04**
	(c)	Explain graphical design multistage adiabatic reactor.	**07**

OR

Q.5	**(a)**	What do you mean by RTD and how to measure.	**03**
	(b)	Explain types of input and its response in ideal PFR.	**04**
	(c)	Explain non ideality present in CSTR and suggest to remove the same.	**07**

****