

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: V ENVIRONMENTAL ENGINEERING

Subject Name: **Elements of Chemical Engineering**

Subject Code: **151301**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
3	0	2	5	70	30	50

Sr. No.	Course Content
1.	Introduction: Thermodynamics, chemical kinetics, classification of reaction, variables affecting the rate of reaction, definition of reaction rate.
2.	Kinetics of Homogeneous Reactions: Concentration dependent reaction rate, single and multiple reactions, elementary and nonelementary reaction, rate constant and representation of reaction rate.
3.	Temperature dependent reaction rate: Temperature dependency and Arrhenius' Law, Temperature dependency from thermodynamics, Temperature dependency from Collision theory.
4.	Principles of chemical engineering, batch reactor, plug flow, continuous reactor, mix flow reactor.
5.	Interpretation of batch reactor: Constant volume batch reactor, variable volume batch reactor, temperature and reaction rate.
6.	Introduction to reactor design; Single Ideal reactors, Ideal batch reactor, space time, space velocity, design of reactor, first and second order reactions; Design for Multiple Reactors: Reactions I parallel, Series – Parallel reactions.
7.	Non ideal flow Time distribution of fluid in vessels, E, the age distribution of fluid Leaving a vessel, Experimental methods-the F curve, the C curve.

Practical / Tutorial

1. To determine Residence Time Distribution (RTD) by experimental.
2. To study the kinetics of Saponification in constant volume batch reactor.
3. Classification of chemical reaction useful in reactor design.

4. The age distribution of fluid leaving a vessels.
5. The age distribution of fluid leaving a vessels.
6. Experiment on Steady-State Plug flow reactor.
7. Experiment on Activation Energy & Temperature Dependency.
8. Experiment on batch Reactor.
9. Plug flow reactor Volume.
10. Plug flow reactor perform.
11. Mixed flow reactor

Reference Books:

1. Chemical Reaction Engineering - Octave & Levenspiel
(3rd Edition, Published by John Wiley and Sons)
2. Basic Chemical Kinetics by G. L. Agrawal
3. Chemical Engineer's Handbook by John Howard Perry, Robert H. Perry
(McGraw-Hill publication)