22PCM312T					Reaction Engineerring					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hours/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	1	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- Exposure to understand of basic principles and terminology in reaction kinetics.
- Develop skills in hazard analysis and able to find out the root cause of an accident.
- To acquaint students towards basic designing of ideal reactors.
- To accustom with the concepts of non-ideality in the reactor systems and studying RTD.
- Provide details on modeling the non-ideality using zero and one parameter models.

UNIT I: Introduction **9 Hr.**

Rate equation, elementary, non-elementary reactions, theories of reaction rate and Prediction; Design equation for constant and variable volume batch reactors, analysis of experimental kinetics data, integral and differential analysis.

UNIT II: Reactor Design **12 Hr.**

Design of continuous reactors - stirred tank and tubular flow reactor, recycle reactors, Equal sized CSTRs in series and parallel, Equal sized PFRs in series and parallel, size comparison of reactors. Design of reactors for multiple reactions - consecutive, parallel and mixed reactions – factors affecting choice, optimum yield and conversion, selectivity, reactivity and yield.

UNIT III: Homogeneous Reactors **10 Hr.**

Non-isothermal homogeneous reactor systems, adiabatic reactors, rates of heat exchanges for different reactors, design for constant rate input and constant heat transfer coefficient, operation of batch and continuous reactors, optimum temperature progression.

UNIT IV: Residence Time Distribution **8 Hr.**

The residence time distribution as a factor of performance; residence time functions and relationship between them in reactor; basic models for non-ideal flow; conversion in non-ideal reactors

Max. 39 Hr.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1: Relate to the basics of kinetics and basic theories to get the underlying mechanisms
CO2: Interpret and evaluate the rate data and get the kinetics parameters.
CO3: Design ideal reactor systems based on experimental data and optimize its performance.
CO4: Select proper reaction mechanism and design reactor by rate data analysis
CO5: Compare the reactor performance with or without internal of external mass transfer limitations
CO6: Design, develop and/or modify reactor systems for specific purpose of real life problems

TEXT/REFERENCE BOOKS

(1) O. Levenspiel," Chemical Reaction Engineering" Willey Eastern, 3rd Ed., 2000 H. S.

(2) Fogler, “Elements of Chemical Reaction Engineering”, 3rd Ed, New Delhi-Prentice Hall, 2001.
(3) J. M. Smith, “Chemical Engineering Kinetics”, 3rd Ed., McGraw- Hill, 1988.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100	**Exam Duration: 3 Hr.**
Part A: 10 Questions each carrying 5 marks	50 Marks
Part B: 5 Questions each carrying 10 marks	50 Marks