22PCM314T					Elective - Process Modelling and Simulation					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hours/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	--	--	100

COURSE OBJECTIVES

- Enhance the understanding basic concepts in mathematical formulation of a model
- Demonstrate the ability to apply the techniques of modeling and simulation to a range of problem areas (CSTR, Batch Reactor and Distillation etc)
- Impart knowledge on Numerical methods for simulation like iterative solution of algebraic equations, regression methods, numerical integration and interpolation techniques etc.
- Demonstrate an understanding of system modeling through the competent use of Computer Simulation methods for CSTR, Batch Reactor and Distillation unit.

Unit I: Introduction to Mathematical Modelling **6 Hr.**

Mathematical models for Petrochemical engineering systems, introduction to fundamental laws. -Gravity flow tank, Interacting and non-interacting systems.

Unit II: Mathematical Modelling in Heat transfer **7 Hr.**

Heat Transfer through metal rod**,** two heated tanks, single component vaporizer, double pipe heat exchanger, shell and tube heat exchanger.

Unit III: Mathematical Modelling in Mass Transfer **6 Hr.**

Ideal binary distillation column, batch distillation with holdup, mass transfer with chemical reaction, steam distillation, Simulation examples for Binary distillation.

Unit IV: Mathematical Modelling in Reaction Engineering **7 Hr.**

CSTR, PFR, Unsteady State PFR Batch reactor, constant hold-up CSTRs, CSTRs with variable hold-ups, non-isothermal CSTR.

Max. 26 Hr.

COURSE OUTCOMES

On completion of the course, the student will be able to

CO1: Summarise the stages involved in the development of a process model
CO2: Construct and simulate a mathematical model for a simple flow systems
CO3: Construct and simulate mathematical models for Heat exchange equipment's
CO4:-Construct and simulate mathematical models for Mass transfer operations
CO5: Construct mathematical models for CSTR and PFR
CO6: Construct mathematical models Batch reactors

TEXT/REFERENCE BOOKS

1. W. L. Luyben, Process Modeling, Simulation and Control for Chemical Engineers, 2nd Ed., McGraw Hill, 1989

2. Upreti, Simant R. Process Modeling and Simulation for Chemical Engineers: Theory and Practice. John Wiley & Sons, 2017
3. Verma, Ashok Kumar. Process Modelling and Simulation in Chemical, Biochemical and Environmental Engineering. CRC Press, 2014
4. R. G. E. Franks, Modeling and Simulation in Chemical Engineering, 1stEd., Wiley-Interscience, 1972
5. T.G. Dobre, J. G. Sanchez Marcano, Chemical Engineering: Modeling, Simulation and Similitude, 1stEd., Wiley-VCH., 2007
6. R. G. Rice, D. D. Do, Applied Mathematics and Modeling for Chemical Engineers, 1stEd., John Wiley & Sons, 1995
7. T.F. Edgar and D.M. Himmelblau, Optimization of Chemical Processes, 2ndEd., McGraw-Hill, 2001

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