SRM UNIVERSITY
FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF CHEMICAL ENGINEERING
COURSE PLAN

Course code: CH2006 **Semester**: II[nd]

Course title: Multicomponent Distillation and Reactors Design **Course period**: Jan – May

Branch / Dept.: M.Tech. Chemical Engineering

Text Books

- Robert E. Treybal, Mass Transfer Operations, 3[rd] Edn., Tata McGraw Hill Book Co., 2012.
- Octave Levenspiel, Chemical Reaction Engineering, 3[rd] Edn., Wiley India Pvt Ltd. 2006.

Reference Books

- Y.V.C. Rao, Chemical Engineering Thermodynamics
- Smith J.M., Chemical Engineering Kinetics, 3[rd] Edn., McGraw Hill International Editions, New Delhi, 1981.
- Scott H. Fogler, Elements of Chemical Reaction Engineering, 4[th] Edn., PrenticeHall of India , NewDelhi, 2005.

Internal Assessment Details

Cycle test – I	: 20 Marks
Model Exam	: 20 Marks
Surprise Test	: 05 Marks
Assignments	: 05 Marks
Total	: 50 Marks

Test Schedule

Day[1]	Test	Topics covered	Test duration
Four week of February	Cycle test - I	40%	2 periods
Second week of April	Model exam	100%	3 hours

[1] Mentioned tentative schedule

Surprise test

The surprise test will not be announced. The questions for this test will be covered until the previous day

Home assignments

Each unit will have home assignment. All the assignments should be submitted on or before the last date of submission.

Course objectives and program outcomes

Course objectives	Program outcomes
Understand the basic theories of multicomponent distillation and heterogeneous reactors Identify the rate limiting steps in heterogeneous reactors and modify the rate of reaction suitably. Learn the design procedure for multicomponent distillation and heterogeneous reactors	Ability to develop the model equations and propose the rate limiting steps from the experimental data points Simplify the complex chemical engineering phenomenon by applying suitable assumptions. Propose the suitable heterogeneous reactor and appropriate design for a given chemical engineering processes.

Teaching Methodology

Chalk and talk for the entire course

Tentative lesson plan

Lectures	Chapters	Main titles	Sub-titles	Approximate Schedule
Lecture #1	Chapter I	Introduction	A detail discussion on multicomponent distillation column	Day 1
Lecture #2		Theories of Multicomponent distillation	P-x-y, T-x-y diagram and multicomponent flash vaporizer	Week 1

Lecture #3			Boiling point and dew point estimation of multicomponent system and key components	Week 2
Lecture #4		Design procedure for multicomponent distillation	Conservation of mass and energy balance in each tray, Minimum reflux ratio, Feed tray position	Week 3
Lecture #5			Temperature and composition in each plate, heat load on reboiler and condenser	Week 4
Lecture #6	Chapter 2	Fluid-solid catalytic reactor design	Solid catalyzed reaction, The rate equation for surface kinetics and Measures of reaction rates in heterogeneous reaction	Week 5
Lecture #7			Experimental methods for finding rates and Determining controlling resistances and rate equation	Week 6
Lecture #8			Plug flow reactor size and Mixed flow reactor size in catalytic reactor	Week 7
Lecture #9	Chapter 3	Fluid-Fluid non-catalytic system design	Factors to consider in selecting a contractor, Straight mass transfer	Week 8
Lecture #10			Mass transfer plus not very slow reaction	Week 9
Lecture #11			Problem in mass transfer and mass transfer plus reaction	Week 10
Lecture #12	Chapter 4	Deactivation of catalysts in packed bed design	Mechanisms of catalyst deactivation, Rate equation and performance equation	Week 11

Lecture #13			The rate equation from experiments, Deactivation in a packed bed reactor	Week 12
Lecture #14	Chapter 5	Fluid-particle reactors design	Type of contracting in gas-solid operation and Conversion of a size mixture in plug flow	Week 13
Lecture #15			Conversion of single sized feed in a mixed flow reactor and Conversion of feed mixture in a mixed flow reactor	Week 14