INSTITUTE	**FACULTY OF TECHNOLOGY**
PROGRAM	**MASTER OF TECHNOLOGY in CHEMICAL ENGINEERING**
SEMESTER	**1**
COURSE TITLE	**ADVANCED SEPARATION PROCESSES LAB**
COURSE CODE	**01CM0114**
COURSE CREDITS	**2**

Objective:

1 To familiarize students with various advanced aspects of separation processes and the selection of separation processes.

Course Outcomes: After completion of this course, student will be able to:

1 Apply the knowledge of mass transfer operations and mechanical operations
2 Students should be able to perform the separation processes of industrial importance
3 Students will be able to investigate the process aspects of chemical industries
4 Provide applicable solutions to separation processes

Pre-requisite of course: Mass Transfer Operation

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
0	0	4	0	0	0	50	50

Contents : Unit	Topics	Contact Hours
Total Hours		

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Experiment 1** To perform the separation of fluoride using adsorption and membrane separation process	4
2	**Experiment 2** To study the adsorption studies in dyes.	2
3	**Experiment 3** To perform separation techniques using reactive distillation	4
4	**Experiment 4** To perform separation using membrane modules	2

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
5	**Experiment 5** To study the impact of varying the concentrate flow rate and the permeate flow rate on the performance of the reverse osmosis system	4
6	**Experiment 6** To study the extraction efficiency of solvents for separating organic compounds from aqueous solutions	4
7	**Experiment 7** To study the extraction of high-value compounds from natural products using supercritical CO2 or other solvents	4
8	**Experiment 8** To explore the absorption of gases (like CO2, NH3, or SO2) into liquids and the subsequent desorption for separation.	4
9	**Experiment 9** To separate mixtures by selective permeation through a membrane under vacuum, particularly for alcohol-water mixtures	2
10	**Experiment 10** To understand the separation of solid-liquid or liquid-liquid phases based on density differences	4
11	**Experiment 11** To understand the principles of crystallization and how it can be used to separate components based on solubility.	2
12	**Experiment 12** To investigate the performance of various membranes in separating solutes based on size, charge, or chemical properties	2
13	**Experiment 13** To study various methods of membrane composition and take a survey to find its application to specific industries	2
14	**Experiment 14** To design the dryer of any type, which is of industrial importance	4
15	**Experiment 15** To design the equilibrium stages in distillation column using Ponchon Savarit method	4
16	**Experiment 16** Case studies of any utility operation, judging the behaviors of various parameters	4
17	**Experiment 17** To consolidate performance parameters of Multiple effect evaporator	4
Total Hours		**56**

Textbook :

1 Mass-transfer operations, Treybal, R. E. , McGraw Hill Education, 2017

References:

1 Chemical Engineering, Volume 2: Particle Technology and Separation Processes, Chemical Engineering, Volume 2: Particle Technology and Separation Processes, J.M. Coulson and J.F. Richardson., Pergamon Press, Oxford., 1991

2 Unit operations of chemical engineering, Unit operations of chemical engineering, McCabe, W. L., Smith, J. C., & Harriott, P., McGraw-hill., 1993

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
10.00	20.00	25.00	25.00	10.00	10.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by white board, may also use any of tools such as collaborative learning, demonstration, role play, Quiz, brainstorming, MOOCs, Active Learning Assignments etc.

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

4 Students will use supplementary resources such as online videos, VirtualLaboratory NPTEL videos, e-courses.

Supplementary Resources:

1 https://archive.nptel.ac.in/courses/103/105/103105060/

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