

**Laboratory Manual for**

**3160507 –**

**Advance Seperation Processes**



## **LUKHDHIRJI ENGINEERING COLLEGE, MORBI**

### **VISION**

To provide quality engineering education and transforming students into professionally competent and socially responsible human beings.

### **MISSION**

1. To provide a platform for basic and advanced engineering knowledge to meet global challenges.
2. To impart state-of-art know- how with managerial and technical skills.
3. To create a sustainable society through ethical and accountable engineering practices.



# LUKHDHIRJI ENGINEERING COLLEGE, MORBI

## CHEMICAL ENGINEERING DEPARTMENT

### VISION

To develop professionally competent & socially responsible chemical engineers by providing quality education.

### MISSION

1. To provide sound basic engineering knowledge to have a successful career in a professional environment.
2. To develop skill sets among the students to make them professionally competent.
3. To cater ethically strong engineers who shall be able to improve the quality of life and to work for sustainable development of society.

### PEO's

PEO-1 To impart knowledge and skills in students to make them professionally competent in chemical process industries.

PEO-2 To motivate students for higher studies in technical and management fields.

PEO-3 To prepare students having soft skills along with leadership quality and management ability to make them successful entrepreneurs.

PEO-4 To implant the ethical principle and norms of engineering practices in terms of health, safety, and environmental context for the sustainable development of society.

### PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## **PSO**

- 1) Apply the knowledge of chemical engineering to accomplish the contemporary need of chemical & Allied Industries.
- 2) To execute the chemical engineering principle and modern engineering tools to design system by considering safety, cost, health, legal, cultural and environmental aspects.

## **Chemical Engineering Department**

### **Laboratory Safety Rules**

- 1 Behave in a responsible manner at all times in the laboratory.
- 2 Ask your teacher before preceding any activity.
- 3 Keep silence.
- 4 Do not touch any equipment, chemicals, or other materials in the laboratory area until you are instructed to do so.
- 5 Perform only those experiments authorized by your teacher.
- 6 Do not eat food, drink beverages, or chew gum in the laboratory.
- 7 Always work in a well-ventilated area.
- 8 Work areas should be kept clean and tidy at all times.
- 9 Wash your hands after performing all experiments.
- 10 Dress properly during a laboratory activity. Long hair, dangling jewellery, and loose or baggy clothing are a hazard in the laboratory.
- 11 Never look into a container that is being heated.
- 12 Obey safety rules.
- 13 After Completion of Experiments turn off equipment properly.
- 14 Drain Water After Compilation of Experiments.
- 15 Before Leaving the Laboratory turns Off Light/Fan.

## **Undertaking of Ethics**

1. I, hereby, promise to abide by the admissible rules and regulations, concerning discipline, attendance, etc. of the L.E.C.MORBI, and also to follow the Code of Conduct prescribed for the Students of the Institute, as in force from time to time and subsequent changes/modifications/amendment made thereto. I acknowledge that, the Institute has the authority for taking punitive actions against me for violation and/or non-compliance of the same.
2. I have performed all the experiments and their calculation done myself.



**Signature of Student**

180310105025

**Enrolment of Student**

For Index:

1	Fundamentals of separation processes	
2	Membrane Separation Processes	
3	Membrane Separation Processes	
4	Membrane Reactor.	
5	Pervaporation	
6	Reactive , catalytic distillation and short path Distillation Unit	
7	Supercritical extraction	
8	ROSE process	
9	Chromatographic separation	
10	Chromatographic separation.	
11	Electrophoretic separations	

**Subject Code: 3160507**  
**Semester – VI**  
**Subject Name: Advanced Separation Processes**

Submission Work:

1	Drawbacks of the conventional separation processes, need for advanced separation processes. Major areas of applications of advanced separation processes.
2	(i) Reverse osmosis, (ii) nanofiltration Working principle, operating parameters, membranes used, transport processes/mechanisms and industrial applications
3	(i) ultrafiltration, (ii) microfiltration (iii) dialysis Working principle, operating parameters, membranes used, transport processes/mechanisms and industrial applications
4	Membrane Reactor: Concept & working, Various types of membrane used for membrane reactor, Membrane bioreactor.
5	Introduction to pervaporation principle, membranes used and application. Hybrid distillation-pervaporation system
6	Reactive and catalytic distillation, short path distillation Concept, advantage & disadvantages
7	Supercritical extraction: Working Principle, unique properties and solubility behavior of supercritical fluids, Advantages of supercritical extraction.
8	ROSE process for purification of crude oil
9	Chromatographic separation: Principle and operation, Chromatographic column Ion exchange chromatography, Gel filtration and affinity chromatography
10	Thin layer and paper chromatography Liquid chromatography, Advantages and disadvantages of chromatographic separations.
11	Electrophoretic separations