

## 20FT021 - NOVEL SEPARATION TECHNIQUES

Hours Per Week :

Total Hours:

L	T	P	C
3		-	3

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L	T	P
45	15	-

WA/RA	SSH/HSB	CS	SA	S	BS
15	30	-	5	5	-

### Course Description and Objectives:

To study about the various separation techniques such as Ion exchange, Osmotic separation, Osmosis and several membrane filtration techniques in food process engineering. To learn about the process and working principle for separating natural and impure materials from food products. Also, to know the various applications of the new technologies in food process engineering.

### Course Outcomes:

Upon successful completion of this course student should be able to:

- Updated of the recent separation process in the field of Food Technology.
- Students are appraised of the alternate technologies.
- The students are able to apply their knowledge on various advancements in separating several products from food

### SKILLS

- ✓ Understand several separation processes for food materials.
- ✓ Understand process for separating unwanted materials as well as micronutrients.
- ✓ Proficient knowledge of various membrane filtration process which can be useful not only in food industry but also for bio fuels.

## **UNIT - I**

Introduction: Separation process in chemical and Biochemical industries, Categorization of separation process, equilibrium and rate governed processes. Introduction to various new separation techniques e.g. Membrane separation, Ion-exchange foam separation, supercritical extraction, liquid membrane, PSA & Freeze drying.

## **UNIT - II**

Membrane based separation technique (MBSTs): Historical background, physical and chemical properties of membranes, Techniques of membrane preparation, membrane characterization, various types of membranes and modules.

## **UNIT - III**

Osmosis and osmotic pressure: Working principle, operation and design of reverse osmosis, ultra filtration, microfiltration, electro dialysis and pervaporation. Gaseous separation by membranes.

## **UNIT - IV**

Ion Exchange: History, basic principle and mechanism of separation, Ion exchange resins, regeneration and exchange capacity. Exchange equilibrium, affinity, selectivity and kinetics of ion exchange. Design of ion exchange systems and their uses in removal of ionic impurities from effluents.

## **UNIT - V**

Introduction to foam separation: micellar separation, supercritical fluid extraction, liquid membrane permeation and chromatographic separation.

### **ACTIVITY:**

- o Case studies on separation and identification of heavy metals in food products

### **TEXT BOOKS:**

1. P J Fellows, Food Processing Technology: Principles and Practice (Woodhead Publishing Series in Food Science, Technology and Nutrition)
2. Singh, R. P., & Heldman, D. R. (2001). *Introduction to food engineering*. Gulf Professional Publishing.