

GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL ENGINEERING

B. E. SEMESTER: VII

Subject Name: **New Separation Techniques**

Subject Code: **170504**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
3	0	2	5	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	Super Critical Extraction:- Working Principal, Advantage & Disadvantages of supercritical solvents over conventional liquid solvents, Advantage & Disadvantages of supercritical extraction over liquid- liquid extraction, Decaffeination, ROSE process, extraction of aromatic from spice and other commercial applications of supercritical extraction, Applications under research	6
2.	Short path Distillation:- Concept & working of short path Distillation Unit (SPDU), Difference between short path Distillation & molecular distillation, applications of SPDU, Economics of short path distillation.	5
3.	Reactive & Catalytic Distillation:- Concept & and History, Advantage & Disadvantages, Various methods of applications, Manufacturing of MTBE, Manufacturing of ETBE and other commercial applications, BALE & KATMAX packing, etc.	6
4.	Pressure Swing Adsorption:- Concept & Working, Advantages & Disadvantages of PSA over cryogenic distillation, four step PSA, six step PSA, Purification of hydrogen, oxygen, Nitrogen & other commercial applications of PSA.	4
5.	Pressure Swing Distillation:- Concept & Working, Advantage & Disadvantages of PSD over azeotropic and Extractive Distillation, Applications	2

6.	Melt Crystallization:- Concept, Different types of crystallization, phase equilibrium, different techniques, commercial applications.	6
7.	Membrane Separation Techniques:- a. Reverse Osmosis (R.O.) Concept of Osmosis & Reverse Osmosis, Different types of Membrane modules and membrane material used for R.O., Advantages & Disadvantages, and Commercial applications of R.O.	6
	b. Ultra filtration:- Concept & working principal, Commercial applications.	5
	c. Pervaporization:- Working principal, Advantages & Disadvantages, Production of absolute alcohol and other commercial applications.	6
	d. Membrane Reactor:- Concept & working, Various modules of membrane used for membrane reactor, Advantages & Disadvantages, applications under research.	4
	e. Membrane or Osmotic Distillation :- Working Principal, Various applications, etc.	4

Practical and Term Work:

Experiments based on above topics should be given to the students.

Text Books:

1. "Membrane Separation Processes" by Kaushik Nath, PHI pvt.Ltd., 2008
2. "Introduction to Process Engineering & Design" by S.B.Thakore & B.I.Bhatt, Tata McGraw-Hill Ltd., 2007

Reference Books:

1. Perry Chemical Engineers Handbook' 7th Edition by R.H.Perry and D.Green.
2. Ullman's Encyclopedia of Industrial Chemistry.
3. "Encyclopedia of Chemical Engineering " by Kirk & Othmer.
4. "Natural Extracts using supercritical carbon dioxide" M.Mukhopadhyay