UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING, ROURKELA

LESSON PLAN

PREPARED BY- SATARUPA SAHU

SUBJECT-NOBEL SEPARATION PROCESS

DEPARTMENT OF CHEMICAL ENGINEERING

WEEK	Topics covered
WEEK 1	Introduction to membrane separation, Importance of separation process
	Origin of membrane, Overall idea about membrane
	Basic principle of membrane separation
	Classification of membrane process
	Characteristics of membrane process
	Advantages and disadvantages of membrane processes
	Major application area of membrane separation
WEEK 2	Future processes of membrane separation
	Types of synthetic membrane
	Micro-porous membrane and Asymmetric membrane
	Thin film composite membrane
	Electrically charged membrane
	Inorganic membrane
WEEK 3	Membrane modules
	Plate and frame module and tubular modules
	Spiral wound module
	Hollow fibre module
	Types of flow patterns
	Concept of osmosis
	Determination of osmotic pressure
WEEK 4	Thermodynamic consideration of osmosis
	Physical significance of chemical potential in osmosis.
	Concept and process Reverse osmosis
	Basic information on reverse osmosis
	High pressure and low pressure reverse osmosis

	Advantages and disadvantages of reverse osmosis
	Applications of reverse osmosis
WEEK 5	Advance Applications of reverse osmosis
	Principle of Nano-filtration
	Process limitation of Nano-filtration
	Industrial application of Nano-filtration
	Principle of ultra-filtration and its advantages
	Ultrafiltration vs conventional filtration
	Configuration of ultrafiltration unit
WEEK 6	Types of devices in ultrafiltration
	Factors affecting the performance of ultrafiltration
	Industrial application of ultra-filtration
	Principle of Micro-filtration
	Fouling in Micro-filtration
	Industrial application of Micro-filtration
	Basic principle of gas Separation
WEEK 7	Membranes for gas separation
	Applications of gas separation
	Advanced applications of gas separation
	Basic principle of pervaporation
	Membrane characteristics
	Cross linking methods
	Mass transfer in pervaporation
WEEK 8	Applications of pervaporation
	Advanced applications of pervaporation
	Basic principle of ion-exchange
	Characteristics of ion-exchange membrane
	Applications of ion-exchange membrane
	Advanced applications of ion-exchange membrane
	Donnan Exclusion
	Membrane distillation
WEEK 9	Configuration of Membrane distillation
	Application of Membrane distillation
	Membrane reactor
	Applications of Membrane reactor

BOOKS FOR REFERENCE:

Membrane Separation Processes by Kausik Nath, PHI Publication.
Unit Operations of Chemical Engineering by Mc Cabe & Smith, Tata Mc Grawhill Publication

	Prepared by	**Approved by**
Signature		
Name	**Satarupa Sahu**	**SOVAN KUMAR SAHOO**
Designation	**Lecturer**	**HOD, Chemical.**
SESSION	**2022-2023**	