UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING, ROURKELA

DEPARTMENT OF CHEMICAL ENGINEERING

LESSON PLAN

SUBJECT	**NOBEL SEPARATION PROCESS**
SUBJECT CODE	**TH 4**
SEMESTER	**6TH**
SESSION	**2025-2026 Semester (22.12.2025 -18.04.2026)**
NAME OF FACULTY	**SUBASINI JENA**

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
WEEK 2	Characteristics of membrane process
	Advantages and disadvantages of membrane processes
	Major application area of membrane separation
	Future processes of membrane separation
WEEK 3	Types of synthetic membrane
	Micro-porous membrane and Asymmetric membrane
	Thin film composite membrane
	Electrically charged membrane
WEEK4	Inorganic membrane
	Membrane modules
	Plate and frame module and tubular modules
	Spiral wound module
WEEK 5	Hollow fibre module
	Types of flow patterns
	Concept of osmosis
	Determination of osmotic pressure
WEEK 6	Thermodynamic consideration of osmosis
	Physical significance of chemical potential in osmosis.
	Concept and process Reverse osmosis
	Basic information on reverse osmosis
WEEK 7	High pressure and low pressure reverse osmosis

	Advantages and disadvantages of reverse osmosis
	Applications of reverse osmosis
	Advance Applications of reverse osmosis
	Principle of Nano-filtration
WEEK 8	Process limitation of Nano-filtration
	Industrial application of Nano-filtration
	Principle of ultra-filtration and its advantages
	Ultrafiltration vs conventional filtration
WEEK 9	Configuration of ultrafiltration unit
	Types of devices in ultrafiltration
	Factors affecting the performance of ultrafiltration
	Industrial application of ultra-filtration
WEEK10	Principle of Micro-filtration
	Fouling in Micro-filtration
	Industrial application of Micro-filtration
	Basic principle of gas Separation
WEEK 11	Membranes for gas separation
	Applications of gas separation
	Advanced applications of gas separation
	REVISION
WEEK 12	Basic principle of pervaporation
	Membrane characteristics
	Cross linking methods
	Mass transfer in pervaporation
	Applications of pervaporation
WEEK 13	Advanced applications of pervaporation
	Basic principle of ion-exchange
	Characteristics of ion-exchange membrane
	Applications of ion-exchange membrane
WEEK 14	Advanced applications of ion-exchange membrane
	Donnan Exclusion
	Membrane distillation
	Configuration of Membrane distillation
WEEK 15	Application of Membrane distillation
	Membrane reactor
	QUIZ TEST
	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	Subasini Jena 18/12/25	Rajesh Tripathy 18/12/2025
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SESSION	**2025-2026 (Semester from Date: 22.12.2025 to Date : 18.04.2026)**	