GUJARAT TECHNOLOGICAL UNIVERSITY
ENVIRONMENTAL ENGINEERING
B. E. SEMESTER: VII

Subject Name: **Advanced Wastewater Treatment Technologies**
Subject Code: **171301**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
4	2	0	6	70	30	30	20

Sr. No.	Course Contents	Total Hrs
1.	**Membrane Separation:** • Membrane process terminology & classification, Materials, Membrane Configuration, membrane operation. • Ultrafilteration, Reverse Osmosis, Microfiltration, Nanofiltration: Applicability, limitations, advantages and disadvantages • Membrane fouling • Electrodialysis.	10
2.	**Ion Exchange:** • Fundamentals of Ion Exchange • Types of Ion exchange resins • General characterization of ion exchange resins • Theory and application of Ion exchange	10
3.	**Carbon adsorption:** Types of adsorbents, Fundamentals of adsorption, Carbon Adsorption kinetics, Activated Carbon treatment, Design of carbon adsorption column	10
4.	Introduction to Membrane Bio-reactors: Fundamentals, Glossary of terms	04
5.	Introduction to Advanced Oxidation Process	04
6.	Hybrid Membrane Systems	04
7.	Wet lands and Land Treatment	04
8.	Advanced Wastewater Treatment for removal of Nitrogen & Phosphorus.	08

9.	**Pressure Filtration:**
	
	• Thickening
	• Conditioning
	• Dewatering
	  ➢ Centrifugation
	  ➢ Filter Presses
	  ➢ Nutsche Filter
	  ➢ Horizontal Plate filter
	  ➢ Drum filter
		10

List of Term work:

1. Numerical based on Adsorption isotherms
2. Numericals based on water softening
3. Assignment on membrane process
4. Sketches and description of pressure filtration devices & equipments.
5. Assignment on Ion Exchange process.
6. Assignment on Advanced Oxidation Process.
7. Assignment on Advanced Wastewater Treatment for removal of Nitrogen & Phosphorus.

Reference Books:

1. Waste water Engineering: Treatment and Disposal by Metcalf & Eddy
2. Environmental Engineering- Peary, Rowe & Tclobaloglous
3. Membrane Systems for Wastewater Treatment –Water Environment Federation
4. Handbook of Wastewater Treatment – Cherminisoff.