GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : VII

ENVIRONMENTAL SCIENCE AND ENGINEERING

Subject Name: Advanced Wastewater Treatment Technologies
Subject Code:171301

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

Sr No	Course Contents
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.
2	**Ion Exchange:** • Fundamentals of Ion Exchange • Types of Ion exchange resins • General characterization of ion exchange resins • Theory and application of Ion exchange
3	**Carbon adsorption:** Types of adsorbents, Fundamentals of adsorption, Carbon Adsorption kinetics, Activated Carbon treatment, Design of carbon adsorption column
4	Introduction to Membrane Bio-reactors: Fundamentals, Glossary of terms.
5	Introduction to Advanced Oxidation Process
6	Hybrid Membrane Systems
7	Wet lands and Land Treatment
8	Advanced Wastewater Treatment for removal of Nitrogen & Phosphorus.
9	**Pressure Filtration:** • Thickening • Conditioning • Dewatering ➢ Centrifugation ➢ Filter Presses ➢ Nutsche Filter ➢ Horizontal Plate filter ➢ Drum filter

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.