

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: III Environmental Management

Subject Name: **Advanced Wastewater Treatment Technologies**

Sr.No	Course content
1.	Advanced Biological Treatment systems: <ul style="list-style-type: none">• Membrane Bio-reactors: Fundamentals, Design, Glossary of terms• Moving Bed Biological Reactor, Static Aerobic Fixed Film reactor ,Fluidized Aerobic Bed reactor
2.	Membrane Separation, Categories of membrane operations, Membrane Applications, Mass transport and permeate flux and fouling in pressure driven processes. Principles of rejections, Membrane biofouling, Types of membrane processes: Reverse Osmosis; Nanofiltration; Ultrafiltration; Electrodialysis; Ultra filtration and its applicability, limitations, advantages and disadvantages; Field evaluation and piloting; Coagulation and membrane separation.
3.	Ion Exchange: <ul style="list-style-type: none">• Fundamentals of Ion Exchange• Types of Ion exchange resins• General characterization of ion exchange resins• Theory and application of Ion exchange
4.	Introduction to Hybrid Membrane Systems
5.	Advanced Oxidation Process: <ul style="list-style-type: none">• Application of Fenton's Reagents• Wet air oxidation• Thermal oxidation
6.	Sludge Dewatering systems: <ul style="list-style-type: none">• Cake Filtration Equipment <p>Batch or Semi batch equipments : ,Plate and frame filter press, Pressure leaf filter, Nutsche filter/dryer ,Horizontal Plate filter/dryer.</p> <p>Continuous Equipments: Rotary Drum filter, Centrifugal filter, Horizontal belt filter, Disc filter</p>

Term work:

Term work will comprise of

1. Assignments on the questions related to Advanced Biological Treatment systems, Membrane Separation, Ion Exchange, Hybrid Membrane Systems, Advanced oxidation process.
2. Sketches and description of Sludge Dewatering systems

Reference Books:

1. Membrane Systems for wastewater Treatment by Water Environment Federation.
2. Practical Wastewater Treatment by David L Russell published by John Wiley & Co.
3. Wastewater Engineering Treatment and Reuse by Metcalf & Eddy