GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 1

Master of Environmental Engineering

Subject Name PRINCIPLES OF WATER TREATMENT

Sr.No	Course content
1.	**Water Demand :**Factors affecting consumption, Variation, Contaminants in water, Nitrates, Fluorides, Detergents, Taste and odour, Radio activity in water.
2.	**Water Quality :**Criteria for different impurities in water for potable and non-potable use.
3.	**Physico – Chemical Processes for Water Quality Control :**Process, dynamics and reactions, intake. **Aeration :**Concepts, limitations of aeration, types of aerators. **Sedimentation:** Types of settling: Type-I and II settling, Processes and tank design. **Coagulation and Flocculation:**Chemical handling and feeding including storage, Coagulation process, Stability of colloids, Destabilization in water and wastewater treatment. Transport of colloidal particles.
4.	**Filtration :**Processes, hydraulics of flow through media, pretreatment. Mathematical models for deep granular filters. Rate control. Slow and rapid sand filters. Dual media filters. Precoat filtration.
5.	**Disinfection :**Processes, Chemical and non-chemical methods, Chlorination, Methods, Uses, Limitations.
6.	**Ion Exchange:**Processes, Materials, Reactions. Methods of operation, Applications.
7.	**Adsorption :** Process, Equilibria and Isotherms. Kinetics, Factors affecting, Mode of operation..
8.	**Specific Treatment :**Control of odour, Colour and taste, Flouride, Fe & Mn.

List of Experiments:

1. Water quality criteria , Standards and sample collection and preservation
2. Physical Parameters of water quality like Solids , turbidity , colour and odour
3. Major Chemical Characteristics of Water using most modern instruments for parameters included in theory
4. Major Biological parameters of water using Presumptive, confirmative and completed test using appropriate culture media and microscope

5. Exposure to the Major Methods of testing of water characteristics which includes Volumertic Analysis, Colourimetric Analysis, Potentiometric analysis and Electrochemical and other methods .
6. Experimentation based on Optimum doses required for different field condition turbidity
7. Model of water treatment for surface water treatmentlime

Reference Books:

1. Water Treatment Processes Hammer and Hammer McGraw Hill Inc
2. Water & Wastewater Engineering Vol. II by Fair, Geyer & Okun - John Wiley
3. Unit Processes by L.G. Rich - John Wiley
4. Environmental Engineering by Peavy, Rowe & Tehobanoglous - McGraw Hill
5. Waste water Treatment For Pollution Control and Reuse : By S.J. Arceiwala and S.R . Asolekar 3rd Edition Mc.Graw –Hill
6. Water Treatment: Principles and Design Published by American Water Works Association.
7. Standard Methods of Testing Water and Waste water Latest Edition Published jointly APHA, AWWWA,WPCF
8. Chemistry for Environmental Engineering -Clair Sawyer, Perry McCarty and Gene Parklin