

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ENVIRONMENTAL ENGINEERING

SEMESTER: V

Subject Name: **Physico Chemical Treatment of Water and Wastewater**

Sr. No.	Course Content
1.	Quality of Water & Wastewater: 1.1 Quality of water and wastewater 1.2 Wholesome water 1.3 Impurity of water 1.4 Characteristics of water 1.5 Examination of water 1.6 Standards of potable water quality 1.7 Characteristics of sewage 1.8 Examination of sewage 1.9 Standards of quality of treated water and wastewater
2.	Quantity of Water & Waste Water: 2.1 Quantity of water and waste water 2.2 Waste water and gas flow 2.3 Water requirement for domestic and industrial purposes 2.4 Waste water formation and estimation 2.5 Spectrum of particulate size distribution 2.6 Variation of flows
3.	Screening and Skimming: 3.1 Purpose of screenings 3.2 Flow equalization 3.3 Types of bar racks and screens 3.4 Disposal of screenings 3.5 Removal of oil, grease etc. 3.6 Flootation 3.7 Skimming tank 3.8 Disposal of skimming
4.	Contract: SEDIMENTATION 4.1 Introduction 4.2 Principles of Sedimentation and Stokes' law applied to fluids 4.3 Characteristics of the settleable solids 4.4 Classification of sedimentation tanks for water and waste water 4.5 Factors influencing sedimentation 4.6 Deciding size of sedimentation tank for water and wastewater 4.7 Standard design loading 4.8 Detention period 4.9 Coagulation – Purpose, Principle 4.10 Types of coagulants and its suitability 4.11 Determination of optimum coagulation dose. 4.12 Feeding of Coagulant and feeding devices

	4.13 Flocculation and flocculation tanks and design criteria of Flocculator 4.14 Clarifiers, its types and design criteria. 4.15 Settling efficiency of particles 4.16 Grit removal
5.	Filtration: 5.1 Theory of filtration 5.2 Mechanism for particle size 5.3 Hydraulics of filters 5.4 Types of filters and their flow direction 5.5 Filter clogging 5.6 Filter washing 5.7 Break through 5.8 Deciding size of filter unit 5.9 Advances in filtration
6.	Softening: 6.1 Chemical precipitation 6.2 Water and wastewater softening 6.3 Estimation of dose of chemical 6.4 Methods of softening - Lime-soda method, Ion-exchange method etc.
7.	Desalination: 7.1 Methods of removal of dissolved solids 7.2 Solar distillation gadgets and plants, Direct freezing, Reverse Osmosis, Electrolysis
8.	Disinfection: 8.1 Introduction 8.2 Methods of disinfection 8.3 Chlorination – Chlorine dose, Chlorine demand, Application of chlorine 8.4 Use of various forms of chlorine, Break through chlorination 8.5 Removal of colour
9.	Sludge Dewatering and Disposal: 9.1 Sources of sludge 9.2 Estimation of bulk density of sludge 9.3 Estimation of rate of filtration 9.4 Principles of dewatering 9.5 Methods of dewatering and suitability 9.6 Thickening of sludge 9.7 Chemical conditioning 9.8 Elutriation of sludge 9.9 Vacuum and pressure filtration 9.10 Sludge lagging

Laboratory Experiences / Tutorials:

1. Quality of Water & Wastewater - Demonstration of various tests related with physical properties of water and wastewater.
2. Quantity of Water & Wastewater - Tutorials based on estimation of quantity of water and waste water.
3. Screening And Skimming Study of different types of screens, their sketches and tutorials based on design.
4. Tutorial on Sedimentation.
5. Filtration Study of various types of filters for water and wastewater. Tutorial based on design of filters.
6. Softening Study of various methods of water softening.
7. Desalination Study of process of desalination.
8. Disinfection Study of various method of disinfections of water and wastewater.
9. Sludge Dewatering And Disposal - Tutorials based on estimation of generation of sludge and study of method of sludge disposal.

Note:

Arrange Technical Site Visit and prepare report Reference Books.

Reference Books:

1. Text book of Water supply and Sanitary Engg., S K Hussain.
2. Water Supply and Sanitary Engg., G S Birdi.
3. A text book of Water Supply, V N Gharpure.
4. A text book of Sanitary Engg, V N Gharpure.
5. Water supply and Sanitary Engg., Vazirani and Chandola.
6. Wastewater Engineering, Treatment, Disposal, Reuse Metcalf and Eddy.
7. Water supply and Sewerage, E W Steel and Terence J McGhee.