WATER AND WASTEWATER TREATMENT

(Elective-III)

Course Code: 15CH2117	**L**	**P**	**C**
	3	**0**	**3**

Course outcomes: On successful completion of the course, the student should be able to

CO1: Analyze water quality and discuss its standards. Discuss sources of pollutant water and its effect on environment.

CO2: Classify various treatment methods during processing of water.

CO3: Use different unit operations equipment in waste water treatment.

CO4: Explain and compare various chemical processes for Waste Water Treatment.

CO5: Explain and compare various biological treatment methods.

UNIT-I (10-Lectures)

Water quality and Characteristics: Safe Drinking Water Act, Microbiological quality of drinking water, chemical quality of drinking water, clean water act, National Pollutant Discharge Elimination System (NPDES), Pollution effect on aquatic life, Ground water quality, Seawater quality, Domestic wastewater, Industrial wastewaters, Infiltration and inflow, Municipal waste water, Composite sampling, Evaluation of Wastewater.

UNIT-II (10-Lectures)

Water Processing: Surface-water treatment, Mixing and Flocculation, Sedimentation, Direct Filtration, Ballasted Flocculation, Flocculator-Clarifiers, Filtration, Chemical Coagulation, Taste and Odor Control, Synthetic Organic Chemicals, Fluoridation, Chlorination, Disinfection By-products, Ozone Disinfection of Potable Water, Groundwater Treatment, Precipitation Softening, Iron and Manganese Removal, Water Stabilization, Groundwater Chlorination, Ion Exchange, Anion

Exchange for Nitrate Removal, Arsenic Removal, Defluoridation, Membrane Filtration, Microfiltration and Ultra filtration, Reverse Osmosis, Distillation of Seawater, Sources of Residuals in Water Treatment, Selection of Processes for Water Treatment Residuals, Description of Pressure Filtration, Disposal of Dewatered Sludge.

UNIT-III (10-Lectures)

Physical Unit Operations: Screening, Coarse Solids Reduction, Flow Equalization, Mixing and Flocculation, Primary Sedimentation, Flotation, Oxygen Transfer, Aeration Systems, Removal of Volatile Organic Compounds.

UNIT–IV (10-Lectures)

Chemical Unit Processes: Role of Chemical Unit Processes in Wastewater Treatment, Fundamentals of Chemical Coagulation, Chemical Precipitation for Improved Plant Performance, Chemical Precipitation for Phosphorus Removal, Chemical Precipitation for Removal of Heavy Metals and Dissolved, Chemical Oxidation, Chemical Neutralization, Scale Control, and Stabilization, Chemical Storage, Feeding, Piping and Control Systems.

UNIT-V (10-Lectures)

Fundamentals of Biological Treatment: Overview of Biological Wastewater Treatment, Composition and Classification of Microorganisms, Introduction to Microbial Metabolism, Bacterial Growth and Energetic, Microbial Growth Kinetics, Modeling Suspended Growth Treatment Processes, Substrate Removal in Attached Growth Treatment Processes, Aerobic Biological Oxidation, Biological Phosphorus Removal, Anaerobic Fermentation and Oxidation, Biological Removal of Toxic and Recalcitrant Organic Compounds, Biological Removal of Heavy Metals.

TEXT BOOK:

1. Mark J. Hammer, Mark J. Hammer, Jr., *"Water and Wastewater Technology"*, 7th Edition, PHI Learning Private Ltd., New Delhi, 2012.

REFERENCE:

1. Metcalf & Eddy, *"Wastewater Engineering Treatment and Reuse"* 4th Edition, Tata McGraw Hill Education Private Ltd. New Delhi,1992.