WATER AND WASTEWATER TREATMENT
(Elective-II)

Course Code: 13CH2115

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Course Educational Objectives: This course introduces the student to
1) The issues of water and wastewater treatment with critical focus on energy sustainability.
2**)** Fundamentals of chemistry, biology, hydraulics and hydrology applicable to sanitary studies.
3) To understand the interrelationships between water and wastewater systems and their impact on the planet.

Course Outcomes: After completion of this course the student would be able to
1) Apply treatment methods and operations of systems separated from wastewater collection.
2) Develop the better and safe water and wastewater treatment techniques.

UNIT-I

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

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

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

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

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.

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