

## ME 821 - EFFLUENT WATER TREATMENTS

### Unit I : Effluent water:

Health and Environmental Concerns in Effluent water Management - Effluent water Characteristics - Effluent water Treatment - Effluent water Reclamation and Reuse - Biosolids and Residuals Management

### Unit II : Effluent water analysis:

Effluent water Constituents - Sampling and Analytical Procedures - Physical Characteristics - Inorganic Nonmetallic Constituents - Metallic Constituents - Aggregate Organic Constituents - Individual Organic Compounds - Biological Characteristics - Toxicity Tests

### Unit III : Physical Unit Operations:

Screening - Course Solids Reduction - Flow Equalisation - Mixing and Flocculation - Gravity separation Theory - Grit Removal - Primary sedimentation - High rate clarification - Flotation - Oxygen Transfer - Aeration systems - Removal of Volatile Organic Compounds (VOCs) by Aeration

### Unit IV : Chemical treatment:

Role of chemical unit process in Effluent water treatment - Fundamentals of chemical coagulation - Basic Definitions - Chemical precipitation for improved plant performance - Chemical precipitation for phosphorous removal - Chemical precipitation for removal of heavy metals - Chemical oxidation - Chemical Neutralization, Scale Control and stabilization - Chemical storage, Feeding, Piping and Control systems

### Unit V : Biological Treatment

Overview of Biological treatment - Composition and Classification - Microbial Metabolism - Bacterial Growth - Microbial Growth Kinetics - Substrate Removal in attached growth - Treatment process - Aerobic Biological Oxidation - Biological Nitrification and Denitrification - Biological phosphorous removal process description - Anaerobic Fermentation and Oxidation - Biological removal of toxic and Recalcitrant Organic Compounds - Biological removal of heavy metals

### Reference:

1. Metcalf & Eddy Inc.; reviewed by George Tchbanoglouf, "Waste Water Engineering" 4<sup>th</sup> Edition McGraw-Hills publication;
2. Mackenzie L Davis, "Water and Waste Water Engineering" McGraw Hill publication, 2010.
3. Cheremisinoff & Nicholas, P; r : "Handbook of Water and Wastewater Treatment Technologies", Elsevie 2007.