# Water and Waste Water Engineering
## SWAYAM Prabha Course Code - C16

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| **PROFESSOR'S NAME** | Prof. B.S. Murty, Prof. C. Venkobachar Prof. Ligy Philip |
| **DEPARTMENT** | Civil Department |
| **INSTITUTE** | Indian Institute of Technology, Madras |
| **Course Outline** | **Water and Wastewater Quantity Estimation** Population forecast; Water demand for various purposes; Estimation of wastewater quantity; Variation in quantity of water and wastewater (2 Lectures) **Water Supply/Distribution Systems** (2 Lectures) **Wastewater Collection Systems** (2 Lectures) **Water/Wastewater Quality Enhancement** Philosophy of treatment; Unit operations and processes; Physical, chemical and biological methods (1 Lecture) **Domestic Wastewater Treatment** Wastewater characteristics; Primary, secondary and tertiary treatment; (1 Lecture) **Physical Unit Processes** Screening; Commutation; Grit Removal; Equilization; Sedimentation; (3 Lectures) **Introduction to Microbiology** Microbial ecology and Growth kinetics; Types of microorganisms; |

aerobic vs. anaerobic processes (2 Lectures)

**Biological Unit Processes**

Aerobic treatment; Suspended growth aerobic treatment processes; Activated sludge process and its modifications; Attached growth aerobic processes; Tricking filters and Rotating biological contactors; Anaerobic treatment; suspended growth, attached growth, fluidized bed and sludge blanket systems; nitrification, denitrification; Phosphorus removal

(10 Lectures)

**Sludge Treatment**

Thickening; Digestion; Dewatering; Sludge drying; Composting (2 Lectures)

**Wastewater Treatment Plant Characteristics**

Sequencing of unit operations and processes; Plant layout; Hydraulic considerations.

(2 Lectures)

**Natural Wastewater Treatment Systems**

Ponds and Lagoons; Wetlands and Root-z one systems. (2 Lectures)

**Surface and Ground Water Treatment for Potable Water Supply**

Water Characteristics; Sequencing of unit operations and processes; (1 Lecture)

**Chemical Unit Processes**

Coagulation-

Flocculation; Filtration; Disinfections; Aeration and Gas transfer; Precipitation; Softening; Adsorption and Ion exchange; Membrane processes (9 Lectures)

**Water Treatment Plant Characteristics**

Plant layout; Hydraulic considerations

(1 Lecture)

**Rural Water Supply;**

(1 Lecture)

**Low Cost Sanitation;**

Septic tanks, Soak-pits. (1 Lecture)

**COURSE DETAILS**

| S. No | Module ID/ Lecture ID | Lecture Title/Topic |
|---|---|---|
| 1 | L1 | Introduction To Water & Waste Water Engineering |
| 2 | L2 | Water & Waste Water Quality Enhancement |
| 3 | L3 | Water & Waste Water Quantity Estimation |
| 4 | L4 | Water & Waste Water Quantity Estimation (Contd) |
| 5 | L5 | Water & Waste Water Characteristics |
| 6 | L6 | Water & Waste Water Characteristics (Contd) |
| 7 | L7 | Water Treatment System Unit Operations |
| 8 | L8 | Sedimentation |
| 9 | L9 | Sedimentation - Continued |
| 10 | L10 | Coagulation & Flocculation |
| 11 | L11 | Coagulation & Flocculation (Contd) |
| 12 | L12 | Softening |
| 13 | L13 | Filtration |
| 14 | L14 | Filtration (Contd) |
| 15 | L15 | Disinfection |
| 16 | L16 | Introduction To Domestic Waste Water Treatment |
| 17 | L17 | Physical Unit Processes For Waste Water Treatment |

| 18 | L18 | Introduction To Microbiology |
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| 19 | L19 | Microbiology- Continued |
| 20 | L20 | Waste Water Treatment Reactor Analysis |
| 21 | L21 | Biological Unit Processes - Activated Sludge Process |
| 22 | L22 | Activated Sludge Process -Modification |
| 23 | L23 | Activated Sludge Process (Contd) |
| 24 | L24 | Aeration,Nitrification And Denitrification |
| 25 | L25 | Natural Waste Water Treatment Systems: Ponds & Lagoons |
| 26 | L26 | Attached Growth Aerobic Process: Trickling Filters And Rotating Biological Contractors |
| 27 | L27 | Anaerobic Treatment |
| 28 | L28 | Anaerobic Process-UASB Reactor (Contd) |
| 29 | L29 | UASB- Continued & Sludge Treatment |
| 30 | L30 | Sludge Treatment (Contd) |
| 31 | L31 | Sludge Treatment Continued & Waste Water Disposal |
| 32 | L32 | Waste Water Disposal And Reuse |
| 33 | L33 | Advanced Waste Water Treatment |
| 34 | L34 | Adsorption |
| 35 | L35 | Ion Exchange, Advanced Oxidation Process |
| 36 | L36 | Industrial Waste Water Treatment |
| 37 | L37 | Water Distribution Networks |
| 38 | L38 | Sanitary sewerage systems |
| 39 | L39 | Storm water sewerage systems |
| 40 | L40 | Intake Structures And Pumping Installations |

**References if Any:**