

# AMEV-19- WASTE WATER ENGINEERING

## OBJECTIVES:

To impart knowledge on characteristics of sewage, primary and secondary treatment of sewage as well as disposal of sludge and treated wastewater.

## UNIT I QUANTITY, COLLECTIONS AND CONVEYANCE

Necessity and objectives of sanitary engineering projects - Definitions - systems of sewerage - quantity of sewage - Fluctuations in flow pattern - Estimation of storm runoff - DWF and WWF - Design flow for separate and combined systems - Hydraulics of sewers - Self cleansing velocities - full flow / partial flow conditions - sewer sections - sewer appurtenances - Design principles and procedures - materials for sewers - sewer joints - sewer laying - sewer cleaning and maintenance - sewage pumping - types of pumps.

## UNIT II QUALITY OF SEWAGE AND PRIMARY TREATMENT

Characteristics and their significance - composition of sewage - physical and chemical analysis - DO, BOD, COD - cycles of decomposition - Objectives and basic principles of sewage treatment - primary treatment - screens - Grit tank principle - settling - sedimentation - Design of settling tanks.

## UNIT III BIOLOGICAL TREATMENT OF SEWAGE

Basic principles of biological treatment - trickling filters - Description and principles of operation - standard / high rate filters - recirculation - activated process diffuser / of sludge - Mechanical aeration - Conventional, high rate and extended aeration - oxidation pond - stabilization ponds - aerated lagoons - SBR, MBR, MBBR.

## UNIT IV SLUDGE MANAGEMENT

Objectives of sludge treatment - properties and characteristics of sludge - Thickenin - sludge digestion - drying beds - conditioning and disposal - dewatering - sludge elutriation.

## UNIT V SEWAGE DISPOSAL AND HOUSE DRAINAGE

Methods - dilution method - self purification of streams - oxygen sag curve - water quality modeling - land disposal - Eutrophication - recycle & reuse of waste effluents. House drainage - Sanitary fixtures / fittings - one pipe system, two pipe system, etc. - General layout of house drainage - street connections. Septic tanks and effluent disposal system

## OUTCOMES:

The students completing the course will have

ability to estimate sewage generation and design sewer system including sewage pumping stations, an understanding on the characteristics and composition of sewage, self purification of streams, ability to perform basic design of the unit operations and processes that are used in sewage treatment, ability to plan house drainage including onsite wastewater treatment and disposal

**TEXT BOOKS:**

- Garg. S.K., "Environmental Engineering", Vol II, Khannah Publishers, New Delhi, 1--4.  
Duggal. K.N., "Elements of public Health Engineering", S.Chand and Company Ltd, New Delhi, 1--8.  
Punmia B.C, Arun K.Jain, Ashok K.Jain, "Wastewater Engineering" Lakshmi publication Pvt. Ltd, New Delhi, 1--8.

**REFERENCES:**

- Manual on wastewater and treatment CPHEECO, Ministry of Urban Affairs and Employment, Govt. of India, New Delhi, 1--0.  
Shah.C. S., "Water supply and Sanitation", Galgotia publishing company, New Delhi, 1--4.  
Metcalf and Eddy, "Waste Water Engineering - Treatment and reuse", Tata McGraw-Hill, New Delhi, 2003.  
4. Mark J. Hammer, Mark J. Hammer Jr, "Water and Waste Water Technology", Prentice hall of India, 5<sup>th</sup> Edition, 2007.

