

# CE701-ENVIRONMENTAL ENGINEERING – II

## SYLLABUS:

### UNIT – I:

**Introduction to sanitation** – systems of sanitation – relative merits &demerits – collection and conveyance of waste water – sewerage –classification of sewerage systems- Estimation of sewage flow and storm water drainage – fluctuations – types of sewers - Hydraulics of sewers and storm drains– design of sewers – appurtenances in sewerage – cleaning and ventilation of sewers.

### UNIT – II:

**Pumping of wastewater:** Pumping stations – location – components– types of pumps and their suitability with regard to wastewaters.

**House Plumbing:** systems of plumbing-sanitary fittings and other accessories–one pipe and two pipe systems – Design of building drainage.

### UNIT – III:

**Sewage characteristics** – Sampling and analysis of wastewater - Physical, Chemical and Biological Examination-Measurement of BOD and COD -BOD equations.

**Treatment of sewage :** Primary treatment-Screens-grit chambers-grease traps–floatation–sedimentation – design of preliminary and primary treatment units.

### UNIT – IV:

**Secondary treatment:** Aerobic and anaerobic treatment process-comparison.

**Suspended growth process:** Activated Sludge Process, principles, designs, and operational problems, modifications of Activated Sludge Processes, Oxidation ponds, Aerated Lagoons.

**Attached Growth Process:** Trickling Filters–mechanism of impurities removal- classification–design-operation and maintenance problems. RBCs, Fluidized bed reactors.

### UNIT V:

**Miscellaneous Treatment Methods:** Nitrification and Denitrification –Removal of Phosphates –UASB–Membrane reactors-Integrated fixed film reactors. Anaerobic Processes: Septic Tanks and Imhoff tanks- working

Principles and Design–disposal of septic tank effluent.

### UNIT – VI:

**Bio-solids (Sludge) management:** Characteristics- handling and treatment of sludge-thickening – anaerobic digestion of sludge.

**Disposal of sewage:** methods of disposal – disposal into water bodies-Oxygen Sag Curve-disposal on land- sewage sickness.