III Year-I Semester
(20CE5008) Environmental Engineering

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

Pre- Requisites: Fundamentals of Chemistry& Environmental Studies

Course Objectives:

- Outline planning and the design of water supply systems for a community/town/city
- Impart understanding of importance of protection of water source quality and enlightens the efforts involved in converting raw water into clean potable water.
- Outline planning and the design of wastewater collection, conveyance and treatment systems for a community/town/city.
- Impart understanding of treatment of sewage and the need for its treatment.
- Effluent disposal method and realize the importance of regulations in the disposal of effluents in rivers.

UNIT–I:

Water Quantity Estimation: Water Requirements Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Design Period, Factors affecting the Design period, Population Forecasting.

Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Design of Distribution network.

Sources of Water: Surface sources: Lakes, Rivers, Impounding Reservoirs - Groundwater sources of water: springs, Wells and Infiltration galleries. Comparison of sources with reference to quality, quantity and other considerations

UNIT-II:

Collection and Conveyance of Water: Types of Intakes; Conveyance of Water:-Gravity and Pressure conduits.

Quality and Analysis of Water: Characteristics of water–physical, chemical and biological; analysis of water – physical, chemical and biological; W.H.O. Quality standards for drinking water

Treatment of Water: basic unit processes and operations for water treatment: Flowchart of water treatment plant, treatment methods: Plain sedimentation, sedimentation with coagulation, filtration, disinfection.

UNIT–III:

Collection and Conveyance of Waste Water – Classification of sewerage systems- Estimation of sewage flow and storm water drainage ;design of sewers and storm drains

Pumping of wastewater: Pumping stations – location – components– types of pumps.

UNIT–IV:

Sewage Characteristics: Analysis of wastewater - Physical, Chemical and Biological Examination-Measurement of BOD and COD - BOD equations.

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

UNIT–V:

Suspended growth process: Activated Sludge Process, principles, designs

Attached Growth Process: Trickling Filters–mechanism of impurities removal- design

Anaerobic Processes: Septic Tanks and Imh off tanks- working Principles and Design

Disposal of sewage: Effluent Discharge Standards; Tertiary Treatment Of Wastewater; Disposal By Dilution-Standards; Land Treatment-Standards; Sludge Disposal.

Course Outcomes:

S.No	Course Outcomes	BTL
1	Plan and design the water distribution networks.	L4
2	Selection of suitable method for water treatment.	L5
3	Plan and design the sewerage systems	L4
4	Analyze sewage and suggest suitable treatment system for sewage treatment	L4
5	Recommend a suitable disposal method with respect to effluent standards.	L5

Correlation of COs with POs& PSOs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	3	1	1	1	1	3	2	3	2
CO2	3	3	2	3	2	3	3	1	1	1	1	3	2	3	2
CO3	3	3	2	3	2	3	3	1	1	1	1	3	2	3	2
CO4	3	3	2	3	2	3	3	1	1	1	1	3	2	3	2
CO5	3	3	2	3	2	3	3	1	1	1	1	3	2	3	2

Text Books:

1. Wastewater Engineering Treatment and Reuse, Metcalf & Eddy, Tata McGraw-Hill edition.
2. Industrial Water and Wastewater Management, K.V.S.G. Murali Krishna
3. Elements of Environmental Engineering, K. N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.

Reference Books:

1. Environmental Engineering, Howard S. Peavy, Donald R. Rowe, George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985
2. Wastewater Treatment for Pollution Control and Reuse, Soli. J Arceivala, Sham R Asolekar, Mc-Graw Hill, New Delhi; 3rd Edition
3. Environmental Engineering –II: Sewage disposal and Air Pollution Engineering, Garg, S. K., Khanna Publishers, 2003
4. Environmental Engineering, D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.