

**B.E. Semester: VI**  
**Department of Civil Engineering**  
**Subject Name: Environmental Engineering – II (CV602-N)**  
**Course Category: Program Course Core (PCC)**

**A. Objectives of the Course:**

- To provide a coherent development to the students for the courses in sector of engineering like Waste Water treatment, Solid Waste Management, house drainage etc.
- To analyze the Waste water sources and waste water characteristics
- To develop various waste water treatment process
- To give an experience in the implementation of engineering concepts which are applied in field of waste Water treatment process
- To present the foundations of many basic Engineering tools and concepts related Environmental Engineering

**B. Teaching & Evaluation Scheme:**

Teaching Scheme				Credit	Evaluation Scheme					Total Marks
L hrs	T hrs	P hrs	Total Hrs		Theory		IE	CIA	Pra/Viva	
					Hrs	Marks	Marks	Marks	Marks	
3	0	2	5	4	3	70	30	20	30	150

**C. Detailed Syllabus:**

**Module – I**

**1. Waste Management Overview:**

Sources of Environmental Contaminant, Classification of Wastes Based on their Nature

**Module – II**

**2. Waste Water Engineering:**

Terminology used in Wastewater Engineering, Sources and Classification of Domestic and Industrial Wastewater, Domestic Wastewater Characteristics - Physical, Chemical, Biological, Estimating Domestic Wastewater Discharge, Sewer System,

Hydraulic Design of Sewers, Sewer Appurtenances, Sewer Pumping Station, Standards for Effluent Disposal and Receiving Water Body

**3. Characteristics of Wastewater:**

Physical, Chemical and Biological Characteristics of Domestic and Industrial Wastewater, Industrial Water and Wastewater: Typical Industries Viz. Textile, Chemical, Dyeing and Dairy, Indian Standards for Effluent Disposal and Receiving Water Body. Disposal of Treated Wastewaters (I) Into Inland Surface Waters; (ii) Into Oceans; (iii) Into Public Sewers (iv) Into Estuaries And (v) Onto Land. Effect of Organic Pollution on River Water Quality, DO Sag Curve

**Module – III**

**4. House Drainage:**

Principles of House Drainage, Pipes and Traps, Classification of Traps: Nalni Trap, Gully Trap, Interception Trap, Grease Trap, Sanitary Fitting, System of Plumbing, House Drainage Plan

**Module – IV**

**5. Unit Operations & Design for Waste Water Treatment:**

Physical Unit - Unit Operations & Design of Screening, Unit Operations of Flow Equalization, Unit Operations of Mixing, Unit Operations and Design of Flocculation, Unit Operations and Design of Sedimentation

Chemical Unit: Unit Operations of Chemical Precipitation

Biological Unit: Unit Operations of Aerobic Attached Growth and Aerobic Suspended Growth Treatment Processes, Anaerobic Suspended Growth Treatment Process, Unit Operations and Design of Activated Sludge and Trickling Filter Process, Septic Tanks, Sludge Digesters, Drying Beds, Unit Operations of Soak Pit, Stabilization Ponds

**6. Solid Waste Management:**

Quantity, Composition and Characteristics of Solid Waste, Methods of Solid Waste Collection, Conveyance, Treatment and Disposal

**D. Lesson Planning:**

<b>Unit No</b>	<b>Title of the Unit</b>	<b>Minimum Hours</b>	<b>Weightage (%)</b>
1	Waste Management Overview	04	09
2	Waste Water Engineering	06	15
3	Characteristics of Wastewater	05	12
4	House drainage	06	14
5	Unit Operations & Design for Waste Water Treatment	20	40
6	Solid Waste Management	04	10
<b>Total:</b>		<b>45</b>	<b>100</b>

**E. List of Practical/Assignments:**

<b>Unit No.</b>	<b>Title of the Unit</b>
1	Introduction to Standards, collection and preservation of samples, sampling techniques and laboratory equipment
2	Determination of Turbidity and Jar
3	Determination of dissolved oxygen
4	Determination of BOD
5	Determination of COD
6	Treatability studies of domestic wastewater (Aeration for 24, 48, 72 hrs) (Finding influent and effluent COD, SVI, MLSS conc.)
7	Characterization of municipal solid waste (physical and chemical)
8	Sewage Collection and Hydraulic Design of Sewer
9	Design of Wastewater treatment units (Primary and Secondary units)

**F. Instructional method and pedagogy (Continuous Internal Assessment Scheme CIA):**

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures, practical and tutorial which carry 05 marks.

- At regular intervals assignments is given. In all, a student should submit all assignments of 05 marks each.
- Classroom participation and involvement in solving the problems in tutorial rooms carries 05 marks.
- Viva voce will be conducted at the end of the semester of 05 marks.
- One internal exam of 30 marks is conducted as a part of mid semester evaluation.

#### **G. Students Learning Outcomes:**

On the successful completion of this course

- The students will gain an experience in the implementation of wastewater engineering on engineering concepts which are applied in environmental engineering.
- The students will get a diverse knowledge of environmental engineering practices applied to real life problems
- The students will learn to understand the theoretical and practical aspects of environmental engineering along with the design and management applications

#### **H. Recommended Study Materials:**

##### **a. Text book & Reference Books:**

1. A.P. Sincero and G.A. Sincero, Environmental Engineering, Prentice Hall of India, New Delhi.
2. G. Tchabanoglous, Solid Waste Treatment and Disposal, McGraw Hill Pub.
3. G.S. Birdie and J.S. Birdie, Water Supply and Sanitary Engineering, Dhanpat Rai Publishing Co. New Delhi.
4. H.S. Peavy, D.R. Rowe and G. Tchbanoglous, Environmental Engineering, McGraw Hill International Edition.
5. J.A. Salvato, Environmental Sanitation, Wiley Interscience.
6. M.L. Davis and D.A. Cornwell, Introduction to Environmental Engineering,
7. S.K.Garg ,Water Supply Engineering by Khanna Publisher
8. Metcalf and Eddy,(Revised by G. Tchobanoglous) Wastewater Engineering & Treatment, disposal Reuse, Tata-McGraw Hill, New Delhi

##### **b. Indian Standards:**

1. IS 16075-1:2015 Guidelines for treated waste water discharge
2. IS 1742:1983 Code of practice for building drainage

3. IS 2064:1993 Code of practice for selection, installation and maintenance of sanitary appliances
4. IS: 2470 (Part – I): 1985 Code of Practice for Installation of Septic Tanks – Design Criteria and Construction
5. IS 2470(Part 2):1985 Code of practice for installation of septic tanks: Part 2 Secondary treatment and disposal of septic tank effluent
6. IS 3114:1994 Code of practice for laying of cast iron pipes
7. IS 4111(Part 1):1986 Code of practice for ancillary structures in sewerage system: Part I Manholes
8. IS 4111(Part 2):1985 Code of practice for ancillary structures in sewerage system: Part II Flusing tanks
9. IS 4111(Part 3):1985 Code of practice for ancillary structures in sewerage system: Part III Inverted syphon
10. IS 4111(Part 4):1968 Code of practice for ancillary structures in sewerage system: Part 4 Pumping stations and pumping mains (rising mains)

**c. Web Materials:**

1. <http://www.epa.gov>
2. <http://www.indiaenvironmentportal.org.in>
3. <http://nptel.iitm.ac.in>
4. <http://www.filtersource.com>
5. <https://dgserver.dgsnd.gov.in>