

B.E. (Civil) Semester: VI

Subject Name: ENVIRONMENTAL ENGINEERING- II (CV604)

A. Course Objective:

- To provide a coherent development to the students for the courses in sector of engineering like Waste Water treatment, slud 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 /Examination Scheme

Teaching scheme				Total Credit	Evaluation Scheme					Total
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract/ Tut.	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
03	00	02	05	04	03	70	30	20	30	150

C. Detailed Syllabus:

Module: I

- **Waste Management Overview** Sources of environmental contaminant, Classification of wastes based on their nature

Module: II

- **Waste Water Engineering:** Terminology used in wastewater engineering, Sources & classification of domestic & 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 & receiving water body
- **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 II

- **House Drainage:** Principles of house drainage, pipes and traps, Classification of traps: nahn trap, gulley trap, interception trap, grease trap, sanitary fitting, system of plumbing, house drainage plan

Module III

- **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 & Design of flocculation, Unit Operations & 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 & Design of activated sludge and trickling filter process, septic tanks, sludge digesters, drying beds, Unit Operations of soak pit, stabilization ponds

Module IV

- **Solid Waste Management:** Quantity, Composition and characteristics of solid waste, Methods of solid waste collection, conveyance, treatment and disposal.

D. Lesson Planning

Sr. No.	Title of the Unit	Minimum Hours	Weightage
1.	Waste Management Overview	04	5%
2.	Waste Water Engineering	05	10%
3.	Characteristics of Wastewater	05	15%
4.	House drainage	06	15%
5.	Unit Operations & Design for Waste Water Treatment	20	40%
6.	Solid Waste Management	05	15%
		45	100%

E. List of Experiments/Designs:

Experiment No.	Name of Experiment	No of turns
1.	Introduction to Standards, collection and preservation of samples,	1

	sampling techniques and laboratory equipment	
2.	Determination of Turbidity and Jar	1
3.	Determination of dissolved oxygen	1
4.	Determination of BOD	1
5.	Determination of COD	1
6.	Treatability studies of domestic wastewater (Aeration for 24, 48, 72 hrs) (Finding influent and effluent COD,SVI, MLSS conc.)	1
7.	Characterization of municipal solid waste (physical and chemical)	1
8.	Sewage Collection and Hydraulic Design of Sewer	2
9.	Design of Wastewater treatment units (Primary and Secondary units)	3

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 and practical which carries marks.
- At regular intervals assignments will be given. Students should submit all assignments during given period.
- Classroom participation and involvement in solving the problems in Tutorial rooms Carries Marks
- Internal exam of 30 marks will be conducted as a part of Mid semester evaluation.
- Experiments shall be performed in the field related to course contents.
- The course includes a practical, where students have an opportunity to build an appreciation for the concept being taught in lectures.

G. Students Learning Outcomes:

- The students will gain an experience in the implementation of environmental Engineering on engineering concepts which are applied in field.
- 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. 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. Tchabanoglous, 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. Web Material

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>