

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL ENGINEERING ENVIRONMENTAL ENGINEERING SUBJECT CODE: 2150603 B.E. 5th SEMESTER

Type of course: Civil Engineering core subject

Prerequisite: The students should have studied the basics of Environmental Engineering

Rationale: The Civil engineer must be aware of the environmental effects of pollutants and should be able to understand the pollutants, their characteristics and manage systems to mitigate them.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
				PA	ALA	ESE	OEP			
3	0	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction: Components of environment, Types of microbes, their growth and role in environment.	02	5
2	Quality and Quantity of Water for supply to towns/Cities: Sources of water, Assessment of domestic and industrial requirement, Impurities in water, Indian standards for drinking water, Water borne diseases and their control. The water (prevention and control of pollution) Act – 1974.	08	20
3	Characteristics of Wastewater: Physical, chemical and biological characteristics of domestic and industrial wastewaters. BOD and COD, study of characteristics of several industrial wastewaters like textile, chemical dairy and pharmaceutical wastewaters. Indian Standards for effluent to be disposed in receiving water body like rivers, estuaries, lakes, sea and oceans. 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 Stream, river water quality, and self purification, DOSAG Curve.	08	20
4	House Drainage: Principles of house drainage, pipes and traps, Classification of traps: nahni trap, gully trap, interception trap, grease trap, sanitary fitting, system of plumbing, house drainage plan for buildings.	06	15
5	Solid Waste Management: Quantity composition and characteristics of solid wastes. Classification of solid wastes. Hazardous solid wastes, Biomedical solid wastes,		

	Typical generation rate for solid wastes, factors affecting the generation rate. Estimation of quantity of solid waste, Onsite handling, storage and processing, collection services, types of collection systems. Determination of vehicle and labor requirements, collection routes, transfer stations, location of transfer stations, transfer means and methods, solid waste processing techniques, Mechanical volume reduction, Thermal volume reduction, manual component separation. Ultimate disposal, land filling with solid waste, Design of landfills.	10	20
6	Air Pollution: Definition, Composition of atmospheric air, Classification and sources of air pollutants. Effects of air pollution on human, plant and material, Air pollution control methods, equipment and safety. Salient features of the Air (Prevention and control of pollution) Act – 1981.	04	10
7	Noise Pollution: Measurement of sound, Sources, Effects and control of noise pollution.	02	5
8	Introduction to: “The environment (Protection) Act – 1986.	02	5

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
45	30	10	10	05	00

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom’s Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. H.S. Peavy, D.R. Rowe and G. Tchbanoglous, Environmental Engineering, McGraw Hill International Edition.
2. M. L. Davis, Water and waste water Engineering, Mc Graw Hill education (India) Pvt. Ltd. 2013 edition.
3. A. P. Sincero and G.A. Sincero, Environmental Engineering, Prentice Hall of India, New Delhi.
4. G. Tchabanoglous, Solid Waste Treatment and Disposal, McGraw Hill Pub.
5. G.S. Birdie and J.S. Birdie, Water Supply and Sanitary Engineering, Dhanpat Rai Publishing Co. New Delhi.
6. H.C. Parkins, Air Pollution, McGraw-Hill Pub.
7. J.A. Salvato, Environmental Sanitation, Wiley Interscience.
8. L.W. Canter, Environmental Impact Assessment, McGraw Hill Pub.
9. M.L. Davis and D.A. Cornwell, Introduction to Environmental Engineering, McGraw Hill International edition.
10. Metcalf and Eddy, (Revised by G. Tchobanoglous Wastewater Engineering: Treatment, disposal Reuse, Tata-McGraw Hill, New Delhi.
- 11.
- 12.
- 13.

Course Outcome:

After learning the course the students should be able to:

1. Understand the role of microorganisms in various components of environments
2. Understand the quality and characteristics of waste water
3. Design and prepare drainage plan of buildings
4. Understand and design solid waste management system
5. Understand various types of pollution
6. Understand various environmental Acts.
7. Determine various water/air quality parameters

List of Experiments:

1. Introduction to Equipment in Environmental Engineering Laboratory
2. Introduction to Standards, Sampling, Collection and Preservation of samples
3. MPN Test
4. Determination of pH and conductivity for water and wastewater
5. Determination of Solids(suspended, dissolved and settleable)
6. Determination of Acidity and Alkalinity
7. Determination of hardness and residual chlorine
8. Determination of fluoride and nitrate
9. Determination of chloride and residual chlorine of water samples
10. Ambient air quality measurement using High Volume sampler
11. Exhaust gas analysis for air pollutants
12. Measurement of noise at different sources using sound meter
13. Characterization of municipal solid waste (physical and chemical)

Design based Problems (DP)/Open Ended Problems:

Below mentioned problems are for reference only. Similar problems may be developed by individual teachers.

1. Design the house drainage system for a plan of proposed buildings and draw drainage plan
2. Write detailed description of decided court cases related to environmental pollution in & Gujarat or any other state.
3. To lay out collection routes for the domestic and commercial area from the map of area and other available data like container size, container utilization factor collection frequency, collection vehicle capacity etc.
4. Develop the design of landfill for a particular Town/Area.
5. Students can drive around his community and identify the principal types of solid waste collection system that are in use.
6. A new residential area composed of five hundred single family dwellings is being developed.
7. Decide truck size and no. of trips must be made for the area from the given data.
8. Decide layout collection routes for the commercial area from given data and map of area.

Major Equipment:

1. pH meter
2. TDS meter
3. High volume sampler
4. Exhaust gas analyzer

5. Ion selective meter for Nitrate, Fluoride and Chloride estimation

List of Open Source Software/learning website:

1. ocw.mit.edu
2. nptel.ac.in

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.