



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Chemical Engineering

Subject Code: DI04005031

Subject Name: Pollution Control and Effluent Treatment

w. e. f. Academic Year:	2025-26
Semester:	4 th
Category of the Course:	PCC

Prerequisite:	Students should know basic chemistry, environmental science, and simple process operations
Rationale:	Study of environmental pollution, related to the chemical industry is must to understand various types of pollutions and its preventive and control majors. The study of this course would help engineers in operating diverse pollution control equipment for controlling gaseous, water and land pollution. They have to perform sampling and analysis of samples from various sources in the industry. Chemical engineer plays an important role in industrial pollution control. This course deals with basic concepts and methods for pollution control in chemical Industry.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Identify sources and effects of pollution.	R, U
02	Select control equipment and methods for air pollution.	R, U, A
03	Use waste water treatment methods.	R, U, A
04	Apply solid waste management methods.	R, U, A

*Revised Bloom's Taxonomy (RBT)

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR		C	Theory		Tutorial / Practical	
			ESE (E)		PA(M)	PA(I)	ESE(V)	
3	0	2	4	70	30	20	30	150



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
Unit – I Introduction to Pollution and its Impact	1.1 Define pollution and pollutant 1.2 Classify pollutants & pollution 1.3 Identify Sources of Pollution like air, water, noise, radioactive and land pollution 1.4 Effect of different pollution- On humans, Plants, animals, environment 1.5 Air and Water quality specifications by GPCB or CPCB 1.6 Overview of environmental legislations in India	10	15
Unit – II Air Pollution Control	2.1 Define Air Pollution, 2.2 Pollutants and its sources 2.3 Classification: primary & secondary, gaseous & particulate 2.4 Describe Particulate control equipment like Gravity Settling Chamber, Cyclone separator, Fabric Filter, Wet Scrubber and Electrostatic Precipitator 2.5 Describe Thermal incineration and stack 2.6 Methods to control of Sulfur dioxide (SO ₂) emission (a) Extraction of sulfur from fuels: Hydrodesulphurization of coal (b) Desulphurization of flue gases by Wet processes (wet scrubbing methods) 2.7 Methods to Control Nitrogen Oxides (NO _x) (a) Modification of operating condition (b) Modification of design condition	10	25
Unit – III Water Pollution Control	3.1 Define Water Pollution. 3.2 Classification of pollutants: organic, inorganic, biological, thermal 3.3 List out different Water Pollution sources 3.4 Effects on humans, aquatic life, agriculture, industry 3.5 Standards: IS 10500, CPCB classification of surface water 3.6 Explain characteristics of water like DO, BOD, COD, VM, Suspended Matter (turbidity), TDS, pH 3.7 Classify Waste water treatment method (a) Describe Primary treatment i. Pretreatment ii. Sedimentation iii. Flootation (b) Describe Secondary treatment i. Aerobic process	15	35



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	ii. Anaerobic process: Activated sludge process iii. Trickling bed filter 3.8 Outline treatment methods for suspended solids removal. (a) Micro straining (b) Coagulation (c) Filtration 3.9 List treatment methods for dissolved solids (a) Ion exchange (b) Reverse Osmosis (c)Electrolysis 3.10 Explain Chemical oxidation/Disinfection 3.11 List out Sludge processing like Thickening, Digestion, Conditioning, Dewatering, Oxidation and ultimate sludge removal 3.12 Draw schematic block diagram of Effluent treatment plant 3.13 List out norms of GPCB for potable water		
Unit – IV Solid Waste Management	4.1 Define solid waste and Hazardous waste 4.2 Classify solid waste 4.3 Effects of improper disposal 4.4 Explain methods of solid Waste Disposal a) Open Dumping (b) Sanitary Land filling (c) Incineration (d) Compositing (e) Biomethanation (f) Reuse, recovery and recycling 4.5 Case studies	10	25
	Total	45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
17	53	30	-----	-----	-----

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Environmental Pollution control	C. S. Rao	New age international Pvt. Limited, 2nd edition



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2	Pollution Control in Process Industries	S. P. Mahajan	Tata Mc GrawHill,
3	Text Book of Environmental Pollution and Control	Dr. Bhatia H. S.	Galgotia Publication, 1st edition, New Delhi
4	Environmental Engineering	G. N. Pandey, Carney G. C.	Tata Mc GrawHill, New Delhi
5	Industrial Safety and Environment	Anupama Prashar Pratibha Bansal	S.K.Kataria & Sons
6	Manual of Chemical Technology, Chem tech-I	D.Venkateswarlu, K.R.Upadrashta, K.D. Chandrasekaran	Chemical Engineering Education Development Centre, IIT, Madras, 1975
7	Chemical Process Safety: Fundamentals with application	Daniel A. Crowl Joseph F. Lowar	3rd Edition, 2011, Prentice Hall, USA

(b) Open-source software and website:

- <https://ndma.gov.in>
- <https://www.csb.gov/videos>
- <https://www.oisd.gov.in>
- <https://cpcb.nic.in>
- <https://gpcb.gujarat.gov.in>
- <https://www.accuweather.com>
- <https://unfccc.int>
- <http://www.cosmolearning.com/courses/fundamentals-of-environmental-pollution-and-control-401/video-lectures>
- <http://www.answers.com/topic/air-pollution>
- https://en.wikipedia.org/wiki/Water_pollution
- <http://www.water-pollution.org.uk/causes.html>
- <http://www.acsregistrars.com/iso14001.asp>

Suggested Practical List:

Sr. No.	Practical/Exercise (Course Outcomes in Psychomotor Domain according to NBA Terminology)	Approx. Hrs Required
1	Prepare detail charts of various Pollutants and sources of pollution	2
2	Prepare detail charts of Air and Water quality specifications by GPCB	2
3	Remove suspended Impurities from air using cyclone system	2



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4	Remove suspended Impurities from air using fabric filter	2
5	Determine hardness (Temporary & Permanent hardness) of given water sample	2
6	Determine pH value of given sample of water.	2
7	Determine the chloride content in given sample.	2
8	Determine Total solid in given sample.	2
9	Determine dissolved oxygen of given sample.	2
10	Determine biological oxygen demand of given sample.	2
11	Determine chemical oxygen demand of given sample.	2
12	Draw neat sketch diagram of ETP plant	2
13	Measure dosage of alum for waste water treatment.	2
14	Prepare chart of solid waste management method suitable for solid waste	2
15	Study of Carbon Credit Policy	2

Suggested Activities for Students:

1. Assignments
2. Technical Quiz/MCQ Test
3. Preparation of non-working models of various water treatment equipment and its importance.
4. Preparation of power-point slides, which include videos, animations of various air pollution and water pollution control equipment

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