GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL
(COURSE CODE: 3350608)

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	5th Semester

1. RATIONALE:

Environment plays very important role in civilization. Social life developed on the bank of Water-source and to maintain the hygiene of society, the used water must be collected safely and hygienically and disposed off in nature by giving proper treatment. So the natural flora and fauna will not get affected by sewage disposal. In present time, solid waste, Noise, Air pollution, land pollution also wants more attention. The growth of industries is remarkable as the development and it will affects the environment as a whole. So topic like Environment Impact Assessment, air-pollution control, noise-pollution control, solid waste management etc. specifically dealt in the curriculum.

2. COMPETENCY(Programme Outcomes (POs) According to NBA terminology)

The course content should be taught and the curriculum should be implemented with the aim to create knowledge and awareness of environment, so that students are able to acquire following competency:

1. Prepare proper report for impact of upcoming industries on the environment.
2. Control the pollution level for mankind.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
L	**T**	**P**		Theory Marks		Practical Marks		Total Marks
				ESE	**PA**	**ESE**	**PA**	
03	**00**	**0 2**	**05**	**70**	**30**	**20**	**30**	**150**

Legends: L- Lecture; **T-** Tutorial/Teacher Guided Student Activity; **P -** Practical; **C -**Credit; **ESE-** End
Semester Examination; **PA**-Progressive Assessment

4. COURSE DETAILS

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub Topics
Unit-I Introduction to Environmental Engineering	1.a Discuss Importance of Environmental engineering 1.b Identify components of Environment.	1.1Introduction 1.2 Component of Environment a. Atmosphere b. Hydrosphere c. Lithosphere d. Biosphere 1.3 Importance of Environment 1.4 Need for public Awareness
Unit-II Ecology	2.a Explain Ecology and Ecosystem 2.b Explain "Pyramid" concept 2.c Discuss biogeochemical cycles	2.1 Concept of Ecology 2.2 Ecosystem 2.3 Component of Ecosystem a. Abiotic b. Biotic 2.4 Balanced Ecosystem 2.5Ecological Pyramid a. Pyramid of Numbers b. Pyramid of biomass c. Pyramid of Energy 2.6 Biogeochemical Cycles a. Hydrological cycle b. Carbon cycle c. Nitrogen cycle d. Phosphorous cycle e. Sulphur cycle 2.7 Biodiversity
Unit-III Environmental Problems	3.a Discuss Acid Rain 3.b Discuss Ozone layer depletion 3.c Discuss Green House effect	3.1 Environmental problems in present world 3.2 Acid Rain a. Causes of acid rain b. How acid rain affects the environment c. Remedial measures to prevent acid rain 3.3 Ozone layer Depletion a. What is stratospheric ozone? b. Ozone layer depletion c. Ozone chemistry d. the ozone hole: the science e. Consequences ozone depletion f. Ultraviolet and Health 3.4 Green House Effect a. Human influence on the climate b. Green house gases c. The importance of methane d. Effect of Green house-effect e. International policies for climate change

Unit	**Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)**	**Topics and Sub Topics**
Unit-IV **Air Pollution and its Control**	4.a Enlist various sources of air pollution 4.b Discuss adverse effects of air pollution 4.c Discuss remedial measures to control air pollution	4.1 Introduction 4.2 Air-pollutants a. Primary b. secondary 4.3 Sources of air pollutant a. Anthropogenic sources b. Natural sources 4.4 Air quality Index 4.5 Health effect of air pollution 4.6 Efforts to Reduce Air Pollution a. Control pollutants at source
Unit-V **Noise Pollution**	5.a Enlist sources of noise pollution 5.b Discuss adverse effects of noise pollution 5.c Discuss remedial measures to control noise pollution	5.1 Introduction 5.2 Computation of Noise pollution 5.3Noise measurement instruments 5.4 Sources of noise 5.5 Impacts of Noise 5.6 Control of noise pollution a. control at source b. control in transmission path c. using protection equipments
Unit-VI **Water Pollution**	6.a Enlist sources of water pollution 6.b Discuss adverse effects of water pollution 6.c Discuss treatment to control water pollution	6.1 Introduction 6.2 Sources of Pollution a. point source b. non-point source 6.3 Groundwater pollution 6.4 Causes of Pollution 6.5 Measurement of pollutants a. sampling b. Physical characteristics c. chemical characteristics d. biological characteristics 6.6 Control of pollution a. sewage b. Industrial wastewater c. agricultural wastewater d. construction site storm water e. storm water from urban area
Unit-VII **Land Pollution**	7.a Discuss how land become polluted 7.b Discuss control measures to prevent land become polluted	7.1Introduction 7.2 Causes of land pollution 7.3 Effect of Land pollution 7.4 Solution for Land pollution
Unit-VIII **Radio-active Pollution**	8.a Discuss sources of radio-active pollution 8.b Discuss control measures for radio-active pollution	8.1 Introduction 8.2 Causes of Radioactive pollution 8.4 Effects of Radioactive pollution 8.3 Radioactive waste management
Unit-IX **Thermal Pollution**	9.a Enlist sources of thermal pollution	9.1 Introduction 9.2 Causes for thermal pollution 9.3 Major problems due to thermal

	9.b Discuss adverse effects of thermal pollution	pollution 9.4 Solution to overcome the problem
Unit-X Environment Impact Assessment	11.a Explain Environmental Impact Assessment(EIA) 11.b Explain strategic environmental assessment. 11.c Discuss the format of Environmental statement 11.d Discuss about assessing quality of environmental impact assessment	10.1 Purpose of EIA 10.2 Strategic environmental assessment 10.3 Environmental assessment process 10.4Environmentral Impact Statement 10.5 EIA report 10.6 Advantages and constraints in use and results

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	troduction to Environmental Engineering	3	1	1	1	5
II	Ecology	4	2	1	1	7
III	Environmental Problems	5	2	1	2	9
IV	Air Pollution and its Control	5	1	1	3	9
V	Noise Pollution	3	1	1	1	5
VI	Water Pollution	8	2	2	4	10
VII	Land Pollution	2	1	0	1	5
VIII	Radio-active Pollution	3	1	1	1	7
IX	Thermal Pollution	2	1	1	0	5
X	Environment Impact Assessment	7	1	2	4	8
	Total:	42	13	11	18	70

Legends: R = Remember , U = Understand , A= Apply and above Level (Bloom's revised taxonomy)

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

6. SUGGESTED LIST OF EXERCISES/PRACTICAL:

The practical / exercises should be properly designed and implemented with an attempt to develop different types of skills(**Course outcomes in psychomotor and effective domain**) so that students are able to acquire the competency. Following is the list of experiments for guidance.

No	Unit No	Exercise	Hours
1.		**Numerical Example**	**04**
		Numerical based on each pollution	

No	Unit No	**Exercise**	**Hours**
2.		**Short notes with Sketches**	**Home Assignment**
		1 Temperature variation in atmosphere 2 Balanced Ecosystem 3 Eltonian pyramid 4 Hydrological cycle 5 Carbon cycle 6 Nitrogen cycle 7 Construction of green house 8 Fabric filter 9 Wet collectors 10 Absorbers 11 yclones 12 Vapour condensers 13 Electrostatic Precipitators	
3.		**Design:**	**02**
		1. Design a air pollution control equipment for given data.	
4.		**Laboratory Experiments**	**10**
		1. Determine pH value of water sample 2. Determine Turbidity of water sample 3. Determine total dissolved solids in water sample 4. Determine B.O.D. of domestic wastewater sample 5. Determine C.O.D. of industrial wastewater sample	
5.		**Visits**	**06**
		1. Industry having air-pollution control measures adopted. 2. ETP for nearby Industrial area. 3. Nearby GPCB laboratory 4. Industry where stake-sampling can be carried out 5. Visit Chemical industry and write a report mentioning the impact on nature of that particular industry **Note: submit detailed report on visits carried out**	
6.		**Seminar:**	**06**
		The topic for the seminar should be given to the group of three students and they shall be asked to defend the seminar in presence of teacher and other students. Each student is required to defend the seminar individually	

7. SUGGESTED STUDENT'S ACTIVITIES

a. Visit nearby polluted-site, photographed it and suggest necessary measures to minimise it.
b. Make photo-collection of pollution emission points

8. SPECIAL INSTRUCTIONAL STRETAGIES (If Any)

Show Pictures of Different Polluted Sites, information of Pollution Control Projects

9. SUGGESTED LEARNING RESOURCES

(A) List of Books:

No	Name of book	Author	Publisher
1	Textbook of Environmental Engineering	P. Venugopala Rao	PHI Learning Pvt. Ltd.
2	Ecology, the link between the natural and the social sciences	Eugene Pleasants Odum	Oxford and IBH Publishing
3	Environmental Engineering: A design approach	Arcadio P. Sincero and Gregoria A. Sincero	Tata Mc-Graw Hill Publications
4	Air Pollution	M N Rao H V N Rao	Tata Mc-Graw Hill Publications
5	Chemistry for Environmental Engineering and Science	Clair Sawyer, Perry Mccarty and Gene Parkin	Tata Mc-Graw Hill Publications
6	Environmental Noise Pollution-Causes, Evils, Legislation and Control	Dr. Vijendra Mahandian	Deep & Deep Publications Pvt Ltd
7	Environmental Chemistry	S. K. Benerji	PHI Learning Pvt. Ltd.
8	Water Pollution	B K Sharma	GOEL publishing House, Meerut
9	Water pollution & Disposal of Waste Water on Land	U.N.Mahida	Tata McGraw Hill
10	Environmental Pollution Control Engineering	C S Rao	New Age International Publishers
11	Water and Waste water Engineering	Gorden ,Fair& Gayer Okun	John willey& Sons
12	Pollution-Causes, Effects and Control	Roy M Harrison	The Royal Society of Chemistry
13	Conducting Environmental Impact assessment in Developing Countries	P. Modak A K Biswas	United Nations University Press
14	Climate Change and India: Vulnerability	P R Shukla	Universities Press

	assessment and Adaption	Subodh K Sharma and Others	(India) Pvt Ltd.
15	Global Environmental Issues- A Climatological Approach	David D. Kemp	Routledge

(B) List of Major Equipment/Materials:

1. Spectrophotometer
2. Water Analysis Kit
3. B.O.D. Incubator
4. Reflux apparatus

(C) List of Software/Learning Websites

1. www.ce.ncsu.edu
2. www.wingra**engineering**.com
3. www.ce.cmu.edu
4. research.ce.udel.edu

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

1 Prof. S. M. Mistry, H.O.D.Civil Engg., Dr. S. & S. S. Ghandhy College of Engg and Tech., Surat

2. Prof. B.V.Modi, Principal BVPIT (DS) , UMRAKH