

GUJARAT TECHNOLOGICAL UNIVERSITY

ENVIRONMENTAL ENGINEERING (13)

FUNDAMENTALS OF AIR POLLUTION

SUBJECT CODE: 2161302

B.E. 6th SEMESTER

Type of course: Applied Science

Prerequisite: Knowledge of subjects Environmental studies

Rationale: To learn the principles and theories behind atmospheric phenomena and air pollution due to emission of gaseous wastes.

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	Air Pollution Sources Air Pollution, Sources of Air Pollution, Air Pollutants and their types , Types of fuels and air pollution caused by each fuel	04	10
2	Effects of air pollutants Effect on health, materials animals and plants, Units of measurement of Air Pollution, Ambient Air Quality Standards.	04	10
3	Air quality monitoring Sampling and analysis of stack gases and ambient air Procedure of Sampling and analysis of stack gases as per relevant IS codes; sampling and analysis of ambient air	06	14
4	Meteorology: Introduction, Atmosphere and its structure, solar radiation, wind circulation, lapse rates, stability conditions, wind velocity profile , maximum mixing depth, wind rose diagram, turbulence, general characteristics of stack plumes, heat island effect, global circulation of pollutants	10	24
5	Dispersion Of Pollutants In The Atmosphere: Introduction: the Eddy diffusion model, Gaussian or normal distribution, the Gaussian dispersion models, evaluation of standard deviations, maximum ground level concentration, in line concentration, calculations of effective stack height	10	24
6	Noise Pollution: Sound and Noise, Characteristics of sound, Noise Pollution, Noise Measurement Scale – Levels and the decibels, Sources of Noise, Effects of Noise on people, Indian Standards, noise pollution control	6	14

7	Odours and their Control	2	4
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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	15	15	15	10	0

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. Air Pollution – by Wark & Warner
2. Air Pollution – by M. N. Rao
3. Air Pollution – by Henry Parkins
4. Air Pollution – by Stern Vol – I

Course Outcome:

After learning the course the students should be able to:

1. Assess the impacts of air pollution on human health, vegetation and materials.
2. Plan strategies to control, reduce and monitor pollution.
3. Relate the various atmospheric stability condition with different plume behavior.
4. Measure the concentration of different air pollutants in stack gases and in the ambient air.
5. Calculate the atmospheric dispersion of discharge from both point and area side sources.
6. Relate historic air pollution events, air quality legislation and relevant international protocols.

List of Experiments:

1. Measurement of Ambient Air Quality Parameters using High Volume Air Samplers.
2. Measurement of Sound Pressure Levels at different locations

Assignments:

1. Air Pollution: Sources and effects on human, vegetation, animals, and materials
2. Assignments and numerical based on Wind Rose Diagram
3. Assignments and numerical based on Maximum Mixing Depth (MMD)
4. Assignments and numerical based on dispersion of Pollutants in the atmosphere.
5. Assignments and numerical based on Noise Pollution
6. Assignments based on odour and control

Design based Problems (DP)/Open Ended Problem:

The students will be given seminars and literature based projects on relevant topics.

Major Equipment:

1. High volume air sampler.
2. PM 10 and PM 2.5 sampler.
3. Stack monitoring kit

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.