GUJARAT TECHNOLOGICAL UNIVERSITY

ENVIRONMENTAL ENGINEERING (13)
DESIGN OF AIR POLLUTION CONTROL EQUIPMENTS
SUBJECT CODE: 2181307
B.E. 8TH SEMESTER

Type of course: Designing

Prerequisite: Knowledge of subjects Fundamantals of Air Pollution and Air Pollution Control & Management

Rationale: This course provides fundamentals for selection and design of the most appropriate air pollution control systems. It also provides the basics regarding the auxiliary equipments necessary for efficient working of air pollution control system of any industry.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
4	4	0	8	70	20	10	30	0	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Selection of air control equipments: Introduction, process parameters, operating conditions, gas characteristics, dust characteristics, performance required, process of selection, Auxiliary equipments	**4**	6
2	Cyclone separators: Introduction, principle and theory, terminology, design and performance equations, Design of cyclone separator ,operation and maintenance, improving performance, Design of multicyclones	**10**	16
3	Fabric Filters: Introduction, principle and theory, terminology, design and performance equations, Design of fabric filter ,operation and maintenance, improving performance.	**10**	16
4	Electrostatic Precipitator: Introduction, principle and theory, terminology, design and performance equations, Numericals , operation and maintenance, improving performance.	**8**	12.5
5	Wet scrubbers: Spray towers : Introduction, principle and theory, terminology Cyclone spray chamber : Introduction, principle and theory, terminology Venturi scrubbers: Introduction, principle and theory, terminology, design and performance equations, Design of wet srubbers ,operation and maintenance, improving performance	**8**	12.5

6	Absorption tower: Introduction, principle and theory, terminology, design and performance equations, Design of Absorption tower.	**8**	12.5
7	Adsorption tower: Introduction, principle and theory, terminology, types of Adsorption towers.	**8**	12.5
8	Auxiliary Equipments: Design of hood, duct, fan and dust handling equipments	**8**	12

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	10	25	25	30	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate 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 Control in Industries Vol. 1 & 2 by T K Ray Publishers: Tech Books International.
2. Air Pollution Control equipment calculations by Louis Theodore.
3. Air Pollution by M N Rao & H V N Rao
4. Air Pollution Control in industries by C S Rao

Course Outcome:

After learning the course the students should be able to:

1. Select the most suitable and cost-effective air pollution control equipment to remove air pollutants generated by using combustion of different fuels.
2. Carry out a preliminary design of air pollution control equipments to remove air pollutants including gases and vapours.
3. Compute the requirements of auxiliary equipments.

List of Tutorials:

1. Numerical and design of Cyclone Separators
2. Numerical and design of fabric filters.
3. Numerical on Electrostatic Precipitators.
4. Assignment on Spray towers and cyclone spray chambers.
5. Numerical and design of Venturi srubbers
6. Numerical and design of Absorption towers.
7. Assignment and Numerical on auxiliary equipments

List of Open Source Software/learning website:

Website of US EPA.

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.