GUJARAT TECHNOLOGICAL UNIVERSITY

ENVIRONMENTAL ENGINEERING (17)

AIR POLLUTION CONTROL EQUIPMENT

SUBJECT CODE: 2731704

M.E. SEM-III

Type of course: Concept, Design Engineering and Drawings

Prerequisite: Basic Concepts and equations regarding air pollution & Control equipment

Rationale Designing of air pollution control units and its detailed drawings.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
				Theory Marks		Practical Marks				
L	T	P	C	ESE (E)	PA (M)	PA (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2#	2	5	70	30	20	10	10	10	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Control of particulate matter: - Dynamics of particles in fluids pollutant Distribution and collection efficiencies. Gravity Collection Equipment : Settling Chambers : Types of flow and settling chambers, efficiencies of chambers Economic sizing of chambers Equipment using Inertial devices: Cyclone flow, Collection efficiency in laminar & turbulent cyclone flow Types of Cyclone: Straight-Through, Reverse Flow Centrifugal collectors, Multiclones centrifugal collections. Electro static precipitation: Basic principles of operations. Types and collection efficiencies of E.S.P Scrubbers Types of scrubber and efficiencies of removal of pollutants. Filters: types of filter and collection efficiencies and pressure drops, cleaning of filters.	12	29
2	Equipment for Gaseous Pollutant Control Flammable mixtures and flares catalytic afterburners. Adsorption devices: Adsorption of gases by moving Bed and its hydraulic control. Types of Gas scrubbers, Adsorption towers: Fixed bed, moving bed, upward flow, inward flow etc.	12	28
3	Mist Elimination Condensation devices: types of condensation devices, direct contact, surface heat exchangers, regenerative systems for energy conservation	04	07
4	Design of Air pollution control equipment Gravity settling chamber Bag filter Cyclone separator Venturi Scrubber Electrostatic precipitator	14	14

	Absorption tower		

Reference Books:

1. Martin Crawford, Air Pollution Control Theory Tata Mc Graw Pub. Co., Delhi
2. Arthor C. Stern, Air Pollution – III Edition Vol. IV Academic Press, Newyork

Course Outcome:

After learning the course the students should be able to:

1. Design the air pollution control equipment
2. Prepare a detailed working drawing of designed units.

List of Experiments and Open Ended Problems: Term work will comprise of

Term work will comprise of assignments on the questions related to the concept and design considerations of

1. Gravity settling chamber
2. Bag filter
3. Cyclone separator
4. Venturi Scrubber
5. Electrostatic precipitator
6. Absorption tower

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier I and Tier II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.