



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3161308

Semester – VI

Subject Name: AIR POLLUTION CONTROL AND MANAGEMENT

Type of course: Professional Elective Course

Prerequisite: Knowledge of Fundamentals of Air Pollution

Rationale: This course provides fundamentals for selection and design of the most appropriate and sustainable air pollution control equipments. It also provides the basics on treatment options and technology selection for specific industrial applications.

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)	
3	1	0	4	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	Emission Quality Requirements: Air quality and emission standards	2
2	Control of Particulates: Particulate control mechanisms Gravity settler: Introduction, Working Principle, Construction, Components, Industrial applications, performance parameters Venturi scrubber: Introduction, Working Principle, Construction, Components, Industrial applications, performance parameters Cyclone separator: Introduction, Working Principle, Construction, Components, Industrial applications, performance parameters Bag filters: Introduction, Working Principle, Types of bag materials, Cleaning mechanisms of bag filter, Construction, Components, Industrial applications, performance parameters Electrostatic precipitator: Introduction, Working Principle, ionization or corona formation, particles charging mechanisms, particle collection, particles removal, Types of ESP, Construction, Components, Industrial applications, performance parameters	12



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3	Control of gaseous pollutants: (a) Control of Sulphur Oxides: Introduction: mechanism of formation of sulphur dioxides; Control methods: Pre combustion :Low sulphur fuel firing, Desulphurization of fuel ; Post combustion :Tall stack dispersion , Flue gas desulphurization :Non regenerative process; Regenerative process ;dry process : carbon adsorption & spray dryer scrubbing (b)Control of Nitrogen Oxides: Introduction : mechanism of formation of nitrogen oxides Control methods: Precombustion or combustion control methods Post combustion : Catalytic decomposition , Catalytic reduction :selective non catalytic reduction and selective catalytic reduction ; Adsorption; Absorption (c) Control of VOCs Introduction , sources and control mechanisms	12
4	Mobile Sources: IC engine and cycle, A/F ratio, sources of air pollutants, control by process change, engine design change, Stratified charge engines, Rotary combustion engines, control by fuel change, catalytic converters, air pollution by diesel engines and turbojet engines.	08
5	Sources and Air Pollution control systems for following industries: (a) Cement industry (b) Chemical industry (c) Thermal Power plant (d) Foundry and induction furnace metal industries (e) Ceramic industry	08

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	30	10	0	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:

Air Pollution control in industries by T.K.Ray
Air Pollution by Kenneth Wark and Cecil Warner
Air Pollution by M.N.Rao



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Air Pollution Control Technology handbook by Karl B Schnell and Jr. Charles A Brown

Air Pollution Control Engineering by Noel De Nevers

Summary report of Environmental protection Agency.

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Select the most appropriate technology to control emission of particulate matter and achieve the ambient and emission standards.	30
CO-2	Identify the best technologies to prevent, control and scrub the SO _x , NO _x and VOC from flue gases.	30
CO-3	Discuss the measures to control the emission from mobile sources.	20
CO-4	Describe the air pollution control measures in major polluting industries.	20

Tutorials:

1. Describe the cyclone separator in detail along with neat sketch.
2. Describe the Gravity Separator in detail along with neat sketch.
3. Describe the bag Filter in detail along with neat sketch.
4. Describe the Venturi Scrubber in detail along with neat sketch.
5. Describe the Electrostatic precipitator in detail along with neat sketch.
6. Enlist and Explain the Control methods of Oxides of Sulphur
7. Enlist and explain the control methods of Oxides of Nitrogen.
8. Write a short note on control methods of VOC.
9. Tutorial based on Mobile Sources.
10. Recognize the sources & types of air pollutants and suggest control technologies for different industries.