GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Leval: PG

Branch: Environmental Management

Course/Subject Code: ME02018011

Course / Subject Name: AIR POLLUTION AND CONTROL

w.e.f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Professional Core Course

Prerequisite:	Knowledge of subjects Fundamentals 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.

Course Outcome:

After Completion of the Course, Student will able to:

No.	Course Outcomes
01	Select the most suitable and cost-effective air pollution control equipment to remove air pollutants.
02	Carry out design of air pollution control equipments to reduce Particulate matter.
03	Discuss requirements of Auxillary Equipments.
04	Discuss control methods of Gaseous Pollutants.

Teaching and Examination Scheme:

Teaching Scheme(in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial/Practical		
L	T	PR	C	ESE (E)	PA/ CA (M)	PA/CA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

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Unit No.	Content	No. of Hours	% of Weightage
1	**Selection of air control equipments:** • Introduction, process parameters • Operating conditions • Gas Characteristics • Dust Characteristics • Performance Required • Process Of Selection And Plant /Site Layout • Auxiliary Equipments	**05**	
2	**Design Fundamentals and Elements of Air Pollution Control System:** • Bernoulli's Equation, Pressure, Types of Pressure, and Pressure Drops/Losses, Pressure Profile for a System, Temperature, Temperature and Pressure Corrections.	**04**	
2	**Cyclone separators:** • Introduction, Principle And Theory • Terminology, Performance Equations • Design Of Cyclone Separator • Operation And Maintenance	**06**	
3	**Fabric Filters:** • Introduction, Principle And Theory • Terminology, Performance Equations • Design Of Bag Filter • Operation And Maintenance	**06**	

4	**Electrostatic Precipitator:** • Introduction, Principle And Theory • Terminology, Performance Equations • Design Of Electrostatic Precipitator • Operation And Maintenance	**06**	
5	**Venturi Scrubber:** • Introduction, Principle And Theory • Terminology, Performance Equations • Design Of Venturi Scrubber • Operation And Maintenance	**06**	
6	**Hood, Duct, Fans and Blowers:** • Introduction, Principle And Theory • Terminology, Performance Equations • Design Of Auxillary Equipments • Operation And Maintenance	**03**	
7	**Control of gaseous pollutants:** • Control of Sulphur Oxides • Control of Nitrogen Oxides • Absorption tower and Adsorption Tower	**06**	
	Total		**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**10**	**15**	**15**	**25**	**25**

Where R:Remember; U:Understanding; A:Application, N:Analyze and E:Evaluate C:Create(as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

- Air Pollution Control in Industries Vol. 1 & 2 by T K Ray Publishers: Tech Books International.
- Air Pollution Control equipment calculations by Louis Theodore.
- Air Pollution by M N Rao & H V N Rao
- Air Pollution Control in industries by C S Rao
- Air Pollution Control Engineering by Lawrence K. Wang, Norman C. Pereira, Yung-Tse Hung
- Handbook-of-Air-Pollution-Control by Margeret-Pence

(b) Open sources of software and website:

- US-EPA Design Modules for control of air pollutants
- ACGIH Design module for Auxillary Equipments

Suggested Course Practical List:

- Design of Cyclone Separator and Preparation of Solid Design module with the help of Software.

- Design of Bag Filter and Preparation of Solid Design module with the help of Software
- Design of Venturi Scrubber and Preparation of Solid Design module with the help of Software
- Design of Electrostatic Precipitator and Preparation of Solid Design module with the help of Software
- Design of Hood and Preparation of Solid Design module with the help of Software
- Design of Duct and Preparation of Solid Design module with the help of Software
- Design of Fans and Blowers and Preparation of Solid Design module with the help of Software

List of Laboratory/Learning Resources Required:

1. Working Model of Cyclone Separator.
2. Working Model of Induced Draft Fan and Blowers.
3. Autocad Software for preparation of Solid Design Module of Control Equipments.

Suggested Activities for Students:

- Industrial visit

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