



SRM VALLIAMMAI ENGINEERING COLLEGE
SRM Nagar, Kattankulathur – 603 203
DEPARTMENT OF CIVIL ENGINEERING



QUESTION BANK
(As per Anna University 2017 Regulation)

SUBJECT CODE/NAME: OCE551-AIR POLLUTION AND CONTROL ENGINEERING
SEM/YEAR: V/III

UNIT I - INTRODUCTION

Structure and composition of Atmosphere – Definition, Scope and Scales of Air Pollution –Sources and classification of air pollutants and their effect on human health, vegetation, animals, property, aesthetic value and visibility- Ambient Air Quality and Emission standards

PART A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Write briefly on Climate change	BT-1	Remembering
2.	Define Air pollution	BT-1	Remembering
3.	Define primary and secondary air pollutants.	BT-1	Remembering
4.	What is pollution quality Index?	BT-1	Remembering
5.	List out the types of air pollutants.	BT-1	Remembering
6.	Write the methods of air quality sampling.	BT-1	Remembering
7.	What is ozone layer depletion?	BT-2	Understanding
8.	List out the composition of atmosphere.	BT-2	Understanding
9.	With a neat sketch show the different layers of atmosphere.	BT-2	Understanding
10.	How do you classify air pollutants?	BT-2	Understanding
11.	List the various elements of atmosphere.	BT-3	Applying
12.	Define air pollutants.	BT-3	Applying

13.	Define global warming.	BT-3	Applying
14.	Name any two effects on plants and also pollutants responsible.	BT-4	Analyzing
15.	What are the devices used for air sampling?	BT-4	Analyzing
16.	What are the effects of air pollutants on human health and property?	BT-4	Analyzing
17.	Indicate the sources of the following trace elements in the atmosphere: Manganese, arsenic, Zinc and chromium	BT-5	Evaluating
18.	What are the instruments used for sampling of waste gases?	BT-5	Evaluating
19.	List out air pollutants responsible for ozone layer depletion.	BT-6	Creating
20.	List out the emission standards	BT-6	Creating
PART B			
1.	(i) Discuss about the air pollutants that contribute climate change. (7) (ii) What are ambient air quality standards? Enumerate its importance (6)	BT-1	Remembering
2.	(i) Enumerate the steps to be taken to control pollution in India. (7) (ii) Mention and explain the categories of air quality index. (6)	BT-1	Remembering
3.	(i) What are the effects of air pollution on human beings and plants? (7) (ii) Distinguish among macroscale, mesoscale and microscale atmospheric motions. (6)	BT-1	Remembering
4.	(i) Write the sources and classification of air pollutants. (ii) Discuss the chemical methods of analysis of air pollutants.	BT-2	Understanding
5.	Explain in detail about the characteristics of air pollution.	BT-2	Understanding
6.	Discuss in detail about the effects of air pollution on human beings, animals and vegetation	BT-3	Applying
7.	Briefly discuss the various sampling techniques involved in air pollution study.	BT-3	Applying
8.	How are air pollutants classified? What are the different sources of air pollutants? Give examples	BT-1	Remembering
9.	Make a detailed discussion on global warming and ozone layer depletion.	BT-4	Analyzing
10.	How is high volume air sampler used for ambient air quality sampling? Explain	BT-4	Analyzing

11.	How air pollutants produce economical effects? Also explain the effects on human beings.	BT-5	Evaluating
12.	(i) Describe the method of analysis for oxides of nitrogen. (7) (ii) Write a note on "Ozone layer depletion". (6)	BT-2	Understanding
13.	(i) Briefly discuss the concepts involved in isokinetic sampling. (7) (ii) What are the types and sources of particulate matter causing air pollution? Briefly explain them. (6)	BT-4	Analyzing
14.	(i) Name the elemental properties of the atmosphere (7) (ii) Discuss in briefly about the ambient air quality standards adopted by EPA (6)	BT-6	Creating

PART C

1.	Explain about air sampling and the systems adopted for that.	BT-2	Understanding
2.	(i) Describe the method of analysis for oxides of nitrogen. (7) (ii) Write a note on "Ozone layer depletion". (6)	BT-1	Remembering
3.	(i) Explain the effects of CO,SO ₂ and heavy metals on human being. (7) (ii) List out the methods for quantitative analysing of air pollutants (6)	BT-4	Analyzing
4.	(i) Discuss the global warming -pollutants responsible, their sources and impacts (7) (ii) Briefly explain the methods of sampling for gaseous pollutants (6)	BT-6	Creating

UNIT II - METEOROLOGY

Effects of Meteorology on Air pollution-Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns-Atmospheric Diffusion Theories-Dispersion models, plume rise.

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Mention two effects of air pollution on meteorological conditions.	BT-1	Remembering
2.	Write the methods of measurement of meteorological parameters in ambient air.	BT-1	Remembering
3.	What is wind rose?	BT-1	Remembering
4.	Define lapse rate.	BT-1	Remembering

5.	Define adsorption and absorption	BT-2	Remembering
6.	State the primary meteorological parameters that influence air pollution.	BT-4	Analyzing
7.	What is inversion?	BT-3	Applying
8.	What do you understand by Air Quality Standards?	BT-4	Analyzing
9.	What is dry adiabatic lapse rate?	BT-6	Evaluating
10.	What are the assumptions involved in Gaussian Dispersion model?	BT-5	Creating
11.	What are Wind roses? State uses.	BT-1	Remembering
12.	Define atmospheric stability.	BT-1	Remembering
13.	Define plume rise.	BT-2	Understanding
14.	What do you mean by stack plume patterns?	BT-3	Applying
15.	Write on Stack monitoring of flue gases.	BT-4	Analyzing
16.	Discuss the role of wind in air pollution dispersion.	BT-2	Understanding
17.	Define Environmental lapse rate.	BT-3	Applying
18.	What do you mean by meteorological model?	BT-2	Understanding
19.	Define stack gas sampling.	BT-5	Evaluating
20.	Define photochemical models.	BT-6	Creating

PART B

1.	Discuss different types of environmental lapse rate	BT-1	Remembering
2.	(i) With neat sketch explain the classifications of plume (7) (ii) Discuss the atmospheric factors influencing the dispersion of air pollutants. (6)	BT-1	Remembering
3.	Write short notes on following: (i) Atmosphere Stability (ii) Air pollution indices	BT-2	Understanding
4.	Explain with neat sketch the plume behavior from a stack with respect to the different prevailing lapse rate.	BT-2	Understanding
5.	Explain the role meteorological elements in the dispersion of air pollutants in the atmosphere.	BT-3	Applying

6.	Explain about the preparation of windrose diagram for a location.	BT-4	Analyzing
7.	Explain the relationship between ambient and adiabatic lapse rates and atmospheric stability.	BT-5	Evaluating
8.	How is maximum mixing depth (MMD) determined?	BT-1	Remembering
9.	Explain with neat sketches, how different atmospheric conditions give rise to different kinds of plume.	BT-1	Remembering
10.	(i)What is adiabatic lapse rate? Discuss the types of adiabatic lapse rate (7) (ii) Mention and explain the types of sampling of gaseous pollutants (6)	BT-2	Understanding
11.	Describe with neat sketches the plume dispersion under different stability classes.	BT-3	Applying
12.	Describe Diffusion theories in the context of air pollution control.	BT-4	Analyzing
13.	(i) Explain the Guassian Plume model, assumptions made and its limitations (7) (ii)A boiler with stack height of 190m and 0.4m diameter is releasing flue gas a velocity of 16m/s at a temperature of 160°C.The wind speed at the stack height is 6m/s and ambient temperature is 35°C.Estimate the plume rise when the environmental lapse rate is +2°C/100m. (6)	BT-4	Analyzing
14.	(i)A thermal power plant burns 100 tonnes of coal with 5.5% sulphur content. Calculate minimum stack height required. The particulate concentration in flue gases is 8000 mg/m ³ and the gas flow rate is 20m ³ /sec (7) (ii)Explain stack gas emission standards for different industries. (6)	BT-6	Creating
PART C			
1.	(i)Explain the significance of wind rose diagram (5) (ii) With neat sketch, explain how different atmospheric conditions give rise to different kind of plume. (10)	BT-6	Creating
2.	Explain the factors influencing the atmospheric dispersion of air pollutants.	BT-1	Remembering
3.	(i) What are the assumptions in the in the Gaussian Model. (5) (ii) Describe the Gaussian plume model with a neat sketch in detail. (10)	BT-2	Understanding

4.	A 100 m stack of diameter 5m releases a gas at 13.5 m/sec with a temperature of 145 ⁰ C. Calculate the plume rise assuming a wind speed at stack height of 4m/sec and an ambient temperature of 15 ⁰ C if the environmental lapse rate is i. 1.5 ⁰ C / 100m ii. 0.5 ⁰ C / 100m	BT-3	Applying
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UNIT - III -CONTROL OF PARTICULATE CONTAMINANTS

Factors affecting Selection of Control Equipment –Gas Particle Interaction–Working principle -Gravity Separators, Centrifugal separators Fabric filters, Particulate Scrubbers, Electrostatic Precipitators.

PART A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Write the formula to calculate the efficiency in cyclone separators.	BT 1	Remembering
2.	What is control efficiency?	BT 1	Remembering
3.	Define electrostatic precipitation.	BT 1	Remembering
4.	List out the physical criteria design consideration of wet scrubbing.	BT 1	Remembering
5.	Mention any two control equipment for removing fine particulate matters.	BT 1	Remembering
6.	State the two broad methods for controlling the gaseous pollutants.	BT 1	Remembering
7.	What are the components of Electrostatic Precipitators?	BT 2	Understanding
8.	Name any four principles by which particulates removal is carried out.	BT 2	Understanding
9.	What are particulates removal mechanisms in filters?	BT 2	Understanding
10.	What are the advantages of scrubbers?	BT 2	Understanding
11.	Define Centrifugal separators.	BT 3	Applying
12.	What do you mean by Gravity separators?	BT 3	Applying
13.	Define SPM.	BT 3	Applying
14.	What are the various types of Particulate scrubbers?	BT 4	Analyzing

15.	Describe the mechanism of Electrostatic precipitator.	BT 4	Analyzing
16.	State the principle of cyclone filter.	BT 4	Analyzing
17.	What do you mean by inertia separation?	BT 5	Evaluating
18.	Define Venturi scrubbers.	BT 5	Evaluating
19.	What is gravitational settling chamber?	BT 6	Creating
20.	Define wet gas scrubbers.	BT 6	Creating
PART B			
1.	(i) Explain the cyclonic spray scrubber with a neat sketch (7) (ii) Design a tubular ESP to treat 10,000 m ³ /hr of a gaseous stream from a paper mill for an efficiency of 99%. Assume an effective migration velocity of 0.075m/sec (6)	BT 1	Remembering
2.	(i) Explain the various methods of filter cleaning with neat sketches. (7) (ii) Calculate the number of cyclones required to treat a flow of 50m ³ /sec with an inlet velocity of 15m/sec. The diameter of cyclone is 1.8m. (6)	BT 2	Understanding
3.	(i) What are the Advantages and Disadvantages of electro static precipitators? (7) (ii) Design a tubular ESP to treat 10,000 m ³ /hr of a gaseous stream from a papermill for an efficiency of 90%. Assume an effective migration velocity of 0.075m/sec. (6)	BT 2	Understanding
4.	Explain with neat sketches the principle and working of the following: (a) Cyclone Separator (b) Electro static precipitator	BT 4	Analyzing
5.	Explain with a neat sketch spray tower wet scrubber.	BT 1	Remembering
6.	Write short notes on settling chamber.	BT 2	Understanding
7.	(i) What is bag house filter? How it works? What are the operational problems involved? (7) (ii) Explain the working principle of cyclone scrubber with a neat sketch. (6)	BT 4	Analyzing
8.	Discuss the functioning and operating problems associated with cyclone separators.	BT 3	Applying
9.	With a neat sketch ,explain the working principle of bag filter.	BT 3	Applying

	Give the equation for average velocity coming to the filter surface		
10.	Derive the expression for the minimum size of particle that can be removed in gravity settling.	BT 4	Analyzing
11.	Discuss in detail about the factors affecting selection of control equipment	BT 5	Evaluating
12.	Make a note on air pollution control by process change and raw material change.	BT 1	Remembering
13.	Explain the air pollution control efforts made in our country.	BT 1	Remembering
14.	Write a brief note about Gas particle Interaction.	BT 6	Creating

PART C

1.	(i)What are the applications of Electro static precipitators in various Industries (5) (ii)A cylindrical Electro static precipitator of diameter 0.4m is used for separating pulverized coal flyash particles from a furnace gas stream. If the volumetric flow rate of the gas is $0.05\text{m}^3/\text{s}$. What will be the length of precipitator for obtaining a collection efficiency is 99.9%.What percent change in electrode collection area is required to increase the collection efficiency from 99.9 to 99.95%. (10)	BT 3	Applying
2.	List the advantages and disadvantages of cyclone separator and also mention their industrial application.	BT 1	Remembering
3.	Explain with neat sketch the working principle of electro static precipitator with its advantage and disadvantage.	BT 4	Analyzing
4.	Explain in detail about gravitational settling chambers with neat sketch.	BT 2	Understanding

UNIT IV - CONTROL OF GASEOUS CONTAMINANTS

Factors affecting Selection of Control Equipment–Working principle - absorption, Adsorption, condensation, Incineration, Bio filters–Process control and Monitoring.

PART – A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Mention the environmental legislation for air pollution control.	BT 1	Remembering

2.	How the gaseous pollutants can be controlled?	BT 1	Remembering
3.	What do you understand by biofilter?	BT 1	Remembering
4.	Differentiate adsorption and absorption.	BT 1	Remembering
5.	Define air quality monitoring.	BT 1	Remembering
6.	What is the limit prescribed for particulate matter in residential area by Pollution Control board?	BT 1	Remembering
7.	Define absorption as it relates to air pollution control devices.	BT 2	Understanding
8.	Name the equipment that uses the principle of absorption for the removal of gaseous pollutant.	BT 2	Understanding
9.	List the factors influencing the efficiency of absorption process.	BT 2	Understanding
10.	What are environmental friendly fuels?	BT 2	Understanding
11.	What are the types of condensation system?	BT 3	Applying
12.	Define absorbers.	BT 3	Applying
13.	What is the importance of activated carbon in adsorption?	BT 3	Applying
14.	What do you mean by regenerative system and non-regenerative systems?	BT 4	Analyzing
15.	Define condensers.	BT 4	Analyzing
16.	Distinguish between Contact condenser and Surface condenser.	BT 4	Analyzing
17.	What is thermal Incinerator?	BT 5	Evaluating
18.	What is catalytic Incinerator?	BT 5	Evaluating
19.	Write the criteria to be adopted for selection of suitable sites for an industry.	BT 6	Creating
20.	What is the chemical composition of air?	BT 6	Creating
PART – B			
1.	Explain how do you control the emission of NO _x by the following treatment methods: (a) Absorption by H ₂ SO ₄ . (b) Absorption by Magnesium Hydroxide (c) Adsorption by Solids.	BT 4	Analyzing
2.	(i) Write the general principle involved in absorption	BT 1	Remembering

	(ii) Explain the criteria to achieve high performance in gas absorption equipments.		
3.	Discuss the sources of pollutants and its control in a cement industry.	BT 1	Remembering
4.	(i) Explain briefly about the methods of biological air treatment system. (ii) Briefly discuss on types of carbon adsorption system with suitable neat sketch.	BT 1	Remembering
5.	(i) Discuss on absorption method of control of gaseous contaminants. (ii) Write a brief notes on engineering design of condensation mode of air pollution control.	BT 2	Understanding
6.	Enumerate and briefly explain various sources of radioactivity in environment and write about its control measures.	BT 2	Understanding
7.	Tabulate the National air quality standards for residential, Industrial and sensitive areas.	BT 2	Understanding
8.	Define adsorption and differentiate between physical and chemical adsorption	BT 3	Applying
9.	Explain the environmental guidelines for setting of industries.	BT 4	Analyzing
10.	How London smog is different from Los Angeles Smog? Explain.	BT 1	Remembering
11.	Write a short note about condensation process with examples.	BT 6	Creating
12.	Write a short note about Incineration process with sketches.	BT 3	Applying
13.	Explain briefly about the bio-filters.	BT 4	Analyzing
14.	Write a brief note about control and monitoring of gaseous pollutants on environment.	BT 5	Evaluating
PART C			
1.	Write a short note on Ultraviolet photolysis of air pollution control method.	BT 6	Creating
2.	Compare the functions of Central and State Pollution Control Board in the area of air pollution control.	BT 4	Analyzing
3.	Explain what do you understand by air quality standards and air quality monitoring.	BT 3	Applying
4.	What are the environmental guide lines for siting of industries to ensure optimum use of natural and man-made resources in sustainable manner.	BT 1	Remembering

UNIT V - INDOOR AIR QUALITY MANAGEMENT

Sources, types and control of indoor air pollutants, sick building syndrome and Building related illness-Sources and Effects of Noise Pollution–Measurement–Standards–Control and Preventive measures.

PART – A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Write the standards for air pollution due to automobiles.	BT 1	Remembering
2.	Define Indoor air pollution.	BT 1	Remembering
3.	Define power of sound.	BT 1	Remembering
4.	List out various types of sound.	BT 1	Remembering
5.	Define noise pollution.	BT 1	Remembering
6.	Define "Hearing Threshold Level"?(HTL)	BT 1	Remembering
7.	Define noise. State the common units in which it is expressed.	BT 2	Understanding
8.	Estimate the sound pressure level resulting from two sources having levels of 70dB and 82 dB.	BT 2	Understanding
9.	List the various ill effects of noise pollution.	BT 2	Understanding
10.	What are the noise control strategies?	BT 2	Understanding
11.	Identify the primary sources of environmental noise.	BT 3	Applying
12.	What is acoustic zoning?	BT 3	Applying
13.	What are the various indoor air pollutants?	BT 3	Applying
14.	Define sick building syndrome.	BT 4	Analyzing
15.	What are the preventive measures of noise pollution.	BT 4	Analyzing
16.	How many decibels can the human ear handle?	BT 4	Analyzing
17.	What are the effects of noise on human health?	BT 5	Evaluating

18.	What are the most common sources of Noise pollution?	BT 5	Evaluating
19.	What are the laws regarding noise pollution?	BT 6	Creating
20.	List out the control and preventive measures of noise pollution.	BT 6	Creating
PART – B			
1.	Explain with examples how air pollution affects building material.	BT 1	Remembering
2.	Explain the air pollution control acts and regulation in India.	BT 1	Remembering
3.	While recording A-weighted sound levels, 4 readings have been taken at a site at different times of day. These readings are: 20, 56, 66 and 42 dB(A) re: 20µPa. What is average sound level?	BT 1	Remembering
4.	Explain in briefly the major factor and action that may help in noise abatement in a modern society.	BT 1	Remembering
5.	(i) Discuss in brief the various sources of noise, and their typical noise levels, in a modern society. (ii) 50dB (A) noise lasting for 55 minutes is followed by 90dB(A) noise lasting for 5 minutes. What is Leq of this noise?	BT 2	Understanding
6.	(i) How could noise control be achieved at the source by design? (ii) How does noise pollution impact on human beings?	BT 4	Analyzing
7.	Explain the control methods and preventive measures undertaken for noise pollution.	BT 4	Analyzing
8.	Differentiate between continuous, intermittent and impulsive noise.	BT 2	Understanding
9.	State and discuss the various sources of noise pollution.	BT 5	Evaluating
10.	(i) Explain how does the noise exposure cause ill effects on human. (ii) List out the air pollutant sources and control measures carried out in petroleum refining unit.	BT 4	Analyzing
11.	Make a note on pollution control measures in a thermal power plant.	BT 6	Creating
12.	Explain the air pollution control efforts made in our country.	BT 3	Applying
13.	Explain noise control methodologies	BT 2	Understanding
14.	Make a note on air quality standard for ambient air and for industrial exposure.	BT 3	Applying

PART – C			
1.	Explain the mechanism by which hearing damage occurs.	BT 4	Analyzing
2.	Explain the methods that could be adopted to control Noise source by design.	BT 3	Applying
3.	(i) What are the sources of noise?How noise become a pollution problem? (ii) "Control of noise at source"-Discuss in detail.	BT 6	Creating
4.	Discuss the effects of noise pollution.	BT 1	Remembering



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