SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

V SEMESTER

1903509-AIR POLLUTION AND CONTROL ENGINEERING

Regulation – 2019

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DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK
(As per Anna University 2019 Regulation)

SUBJECT CODE/NAME: 1903509 - 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. – Ambient and stack sampling and Analysis of Particulate and Gaseous Pollutants			

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.	Demonstrate about ozone layer depletion?	BT-2	Understanding
8.	Outline the composition of atmosphere.	BT-2	Understanding
9.	With a neat sketch show the different layers of Atmosphere.	BT-2	Understanding
10.	Classify the air pollutants?	BT-2	Understanding
11.	Develop the various elements of atmosphere.	BT-3	Applying
12.	Define air pollutants.	BT-1	Remembering
13.	Recall the term global warming.	BT-1	Remembering
14.	Name any two effects on plants and also pollutants Responsible.	BT-1	Remembering
15.	Summarize the devices used for air sampling?	BT-2	Understanding
16.	Illustrate the effects of air pollutants on human health and property?	BT-2	Understanding
17.	Identify the effects of air pollution on materials.	BT-3	Applying
18.	Choose the instruments used for sampling of waste	BT-3	Applying

	Gases?		
19.	Identify the air pollutants responsible for ozone layer depletion.	BT-3	Applying
20.	List out the emission standards.	BT-1	Remembering
21.	Define acid rain.	BT-1	Remembering
22.	What are the effects of photochemical smog?	BT-1	Remembering
23.	Define isokinetic conditions.	BT-1	Remembering
24.	How is ozone hole formed?	BT-2	Understanding
25.	What is an aerosol?	BT-1	Remembering
PART B			
1.	Discuss about the air pollutants that contribute climate Change.	BT-3	Applying
2.	Enumerate the steps to be taken to control air pollution in India.	BT-1	Remembering
3.	Distinguish among macro scale, mesoscale and micro scale atmospheric motions.	BT-2	Understanding
4.	Write the sources and classification of air pollutants.	BT-1	Remembering
5.	Explain in detail about the characteristics of airpollution.	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 is air pollutants classified? What are the different Sources of air pollutants? Give examples.	BT-1	Remembering
9.	Summarize the various Cycles of atmosphere.	BT-2	Understanding
10.	Interpret how the high volume air sampler used for Ambient air quality sampling? Explain.	BT-2	Understanding
11.	Explain the causes of "Ozone layer depletion" with Necessary equations.	BT-2	Understanding
12.	Describe about ambient air quality standards? What Are the objectives?	BT-2	Understanding
13.	Mention and explain the categories of air quality Index.	BT-1	Remembering
14.	Construct with neat sketch about the layers of atmosphere.	BT-3	Applying
15.	What is the greenhouse effect? What is the impact of the greenhouse effect?	BT-1	Remembering

16.	What are the major air pollutants produced by humans? What are their effects?	BT-1	Remembering
17.	Briefly explain the formation of Ozone	BT 3	Applying
PART C			
1.	Discuss in detail about the effects of air pollution on property and aesthetic value and visibility.	BT-3	Applying
2.	Write a note on greenhouse gases? Explain their benefits and ill effects on global environment.	BT-1	Remembering
3.	Explain briefly the causes and effect of Acid rain.	BT-2	Understanding
4.	Discuss about the pollutants responsible for global warming with their source and impacts.	BT-3	Applying
5.	What is Smog, and how is it created? Also, mention the types of smog.	BT-1	Remembering

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.

PART – A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Mention two effects of air pollution on meteorological conditions.	BT 1	Remembering
2.	Define Fumigation.	BT 1	Remembering
3.	What are the types of wind rose diagram?	BT 1	Remembering
4.	Define lapse rate.	BT 1	Remembering
5.	Define adsorption and absorption.	BT 1	Remembering
6.	Write the primary meteorological parameters that influence air pollution.	BT 1	Remembering
7.	What is inversion?	BT 2	Understanding
8.	Define coning.	BT 2	Understanding
9.	What is dry adiabatic lapse rate?	BT 2	Understanding
10.	What are the assumptions involved in Gaussian Dispersion model?	BT 2	Understanding
11.	What are Wind roses? State uses.	BT 3	Applying
12.	Define atmospheric stability.	BT 3	Applying
13.	Define plume rise.	BT 3	Applying
14.	What do you mean by stack plume patterns?	BT 2	Understanding
15.	Write on Stack monitoring of flue gases.	BT 3	Applying

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 3	Applying
19.	Define negative lapse rate.	BT 2	Understanding
20.	Define photochemical models.	BT 3	Applying
21.	What is the word MINAS stands for?	BT 2	Understanding
22.	Briefly explain Eulerian dispersion model.	BT 3	Applying
23.	What is a chimney?	BT 2	Understanding
24.	Define pollution rose.	BT 2	Understanding
25.	Express Gaussian dispersion model equation.	BT 1	Remembering

PART – B

1.	Discuss different types of environmental lapse rate.	BT 4	Analyzing
2.	Discuss the atmospheric factors influencing the dispersion of air pollutants.	BT 3	Applying
3.	Write short notes on Atmosphere Stability and Air pollution indices.	BT 3	Applying
4.	Explain stack gas emission standards for different industries.	BT 4	Analyzing
5.	Explain the role of meteorological factors in the dispersion of air pollutants in the atmosphere.	BT 3	Applying
6.	Explain about the wind rose diagram.	BT 3	Applying
7.	Explain the relationship between ambient and adiabatic lapse rates and atmospheric stability.	BT 4	Analyzing
8.	A 100m stack of diameter 5m releases a gas at 13.5m/sec with a temperature of 145^0C.Calculate the Plume rise assuming a wind speed at stack height of 4m/sec and an ambient temperature of 15^0C if the ELP is 1.5^0C /100m and 0.5^oC/100m.	BT 4	Analyzing
9.	Explain with neat sketch the plume behavior from a stack with respect to the different prevailing lapse rate.	BT 4	Analyzing
10.	What is adiabatic lapse rate? Discuss the types of adiabatic lapse rate.	BT 3	Applying
11.	Determine the effective height of a stack from the following data. Wind velocity=3m/sec. Air temperature = 21ºC Physical Stack =200m with 0.98 inside diameter.	BT 3	Applying

	Atmospheric pressure= 1000 millibars. Stack gas velocity = 11.2 m/sec. Stack gas temperature = 160ºC.		
12.	Describe Diffusion theories in the context of air pollution control.	BT 3	Applying
13.	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. Molecular Weight of SO_2 =64.	BT 4	Analyzing
14.	An industry uses 3.6ml of oil fuel per year. It has also been calculated that for every 1ml of fuel oil burnt in the industry per year, the quantities of various pollutants emitted are given below. PM=3 t/year SO_2 =60 t/year NO_X=8t/year HC=0.5t/year CO=0.5t/year Calculate the required height of the chimney for the safe dispersion of the pollutants.	BT 5	Evaluating
15.	Explain with neat sketches, how different atmospheric conditions give rise to different kinds of plume.	BT 3	Applying
16.	Mention and explain the types of sampling of gaseous pollutants.	BT 4	Analyzing
17.	How is maximum mixing depth (MMD) determined?	BT 4	Analyzing
PART C			
1.	(i)Explain the significance of wind rose diagram. (5) (ii)With a neat sketch, explain how different atmospheric conditions give rise to different kind of plume? (10)	BT 5	Evaluating
2.	Explain the factors influencing the atmospheric dispersion of air pollutants.	BT 4	Analyzing
3.	What are the assumptions in the Gaussian Model? Describe the Gaussian plume model with a neat sketch in detail.	BT 4	Analyzing
4.	During rush hour on a busy road crossing, nearly 1500 vehicles ply per hour at an average speed of 30km/hour. Of these about 80% cars use leaded petrol. The average fuel consumption is 1 litre for an average of 8km of travel. Considering that 80% of the lead present in the fuel is emitted in the form of particulate aerosol, find the emission	BT 5	Evaluating

	rate of lead aerosol in the ambient air. (Given-Concentration of lead in the fuel is 0.4μg/L; Assume bright day with light wind).		
5.	List out the various meteorological parameters influencing air pollution. Explain them.	BT 5	Evaluating

<table>
<tr><td colspan="4" align="center">UNIT III - CONTROL OF PARTICULATE CONTAMINANTS</td></tr>
<tr><td colspan="4">Factors affecting Selection of Control Equipment – Gas Particle Interaction – Working principle, Design and performance equations of Gravity Separators, Centrifugal separators Fabric filters, Particulate Scrubbers, Electrostatic Precipitators – Operational Considerations.</td></tr>
<tr><td colspan="4" align="center">PART – A</td></tr>
<tr><td>Q.NO</td><td align="center">QUESTIONS</td><td>BT LEVEL</td><td>COMPETENCE</td></tr>
<tr><td>1.</td><td>Write the formula to calculate the efficiency in cyclone separators.</td><td>BT 1</td><td>Remembering</td></tr>
<tr><td>2.</td><td>What is control efficiency?</td><td>BT 1</td><td>Remembering</td></tr>
<tr><td>3.</td><td>Define electrostatic precipitation.</td><td>BT 1</td><td>Remembering</td></tr>
<tr><td>4.</td><td>List out the physical criteria design consideration of wet scrubbing.</td><td>BT 1</td><td>Remembering</td></tr>
<tr><td>5.</td><td>Mention any two-control equipment for removing fine particulate matters.</td><td>BT 1</td><td>Remembering</td></tr>
<tr><td>6.</td><td>State the two broad methods for controlling the gaseous pollutants.</td><td>BT 1</td><td>Remembering</td></tr>
<tr><td>7.</td><td>What are the components of Electrostatic Precipitators?</td><td>BT 2</td><td>Understanding</td></tr>
<tr><td>8.</td><td>Name any four principles by which particulates removal is carried out.</td><td>BT 2</td><td>Understanding</td></tr>
<tr><td>9.</td><td>What are particulates removal mechanisms in filters?</td><td>BT 2</td><td>Understanding</td></tr>
<tr><td>10.</td><td>What are the advantages of scrubbers?</td><td>BT 2</td><td>Understanding</td></tr>
<tr><td>11.</td><td>Define Centrifugal separators.</td><td>BT 3</td><td>Applying</td></tr>
<tr><td>12.</td><td>What do you mean by Gravity seperators?</td><td>BT 3</td><td>Applying</td></tr>
<tr><td>13.</td><td>Define SPM.</td><td>BT 2</td><td>Applying</td></tr>
<tr><td>14.</td><td>What are the various types of Particulate scrubbers?</td><td>BT 1</td><td>Remembering</td></tr>
<tr><td>15.</td><td>Describe the mechanism of Electrostatic precipitator.</td><td>BT 3</td><td>Applying</td></tr>
<tr><td>16.</td><td>State the principle of cyclone filter.</td><td>BT 3</td><td>Applying</td></tr>
<tr><td>17.</td><td>What do you mean by inertia separation?</td><td>BT 3</td><td>Applying</td></tr>
<tr><td>18.</td><td>Define Venturi scrubbers.</td><td>BT 3</td><td>Applying</td></tr>
<tr><td>19.</td><td>What is gravitational settling chamber?</td><td>BT 1</td><td>Remembering</td></tr>
<tr><td>20.</td><td>Define wet gas scrubbers.</td><td>BT 3</td><td>Applying</td></tr>
<tr><td>21.</td><td>List out the types of scrubbers.</td><td>BT 1</td><td>Remembering</td></tr>
</table>

22.	Name the common method of filter cleaning.	BT 2	Understanding
23.	What are the main objectives of controlling the air pollution?	BT 2	Understanding
24.	What are the different types of emissions?	BT 2	Understanding
25.	What is the formula for finding the minimum size of particle that can be removed in gravity settling chamber?	BT 2	Understanding
PART – B			
1.	Explain the spray Chambers with a neat sketch.	BT 4	Analyzing
2.	Explain the various methods of filter cleaning with neat sketches.	BT 4	Analyzing
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 3	Applying
4.	Explain with neat sketches about the principle and working of Cyclone Separator.	BT 4	Analyzing
5.	Explain with a neat sketch of spray tower wet scrubber.	BT 3	Applying
6.	Write short notes on settling chamber.	BT 4	Analyzing
7.	What is bag house filter? How it works? What are the operational problems involved?	BT 4	Analyzing
8.	Explain the working principle of cyclone scrubber with a neat sketch.	BT 3	Applying
9.	Explain the self-cleaning properties of the environment.	BT 5	Evaluating
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 3	Applying
12.	Make a note on air pollution control by process change and raw material change.	BT 4	Analyzing
13.	Explain the air pollution control efforts made in our country.	BT 4	Analyzing
14.	Write a brief note about Gas particle Interaction.	BT 3	Applying
15.	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.	BT 4	Analyzing

16.	Explain with neat sketches the principle and working of Electro static precipitator.	BT 3	Applying
17.	What is bag house filter? How it works? What are the operational problems involved?	BT 4	Analyzing

PART – C

1.	A cylindrical Electro static precipitator of diameter 0.6m is used for separating pulverized coal flyash particles from a furnace gas stream. If the volumetric flow rate of the gas is $0.25m^3$/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%.	BT 4	Analyzing
2.	List the advantages and disadvantages of cyclone separator and also mention their industrial application.	BT 4	Analyzing
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 5	Evaluating
5.	What are the applications of Electro static precipitators in various Industries?	BT 5	Evaluating

UNIT IV - CONTROL OF GASEOUS CONTAMINANTS

Factors affecting Selection of Control Equipment – Working principle, Design and performance equations of absorption, Adsorption, condensation, Incineration, Bio scrubbers, Bio filters – Process control and Monitoring - Operational Considerations.

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 2	Understanding
15.	Define condensers.	BT 3	Applying
16.	Distinguish between Contact condenser and Surface condenser.	BT 2	Understanding
17.	What is thermal Incinerator?	BT 3	Applying
18.	What is catalytic Incinerator?	BT 3	Applying
19.	Write the criteria to be adopted for selection of suitable sites for an industry.	BT 2	Understanding
20.	What is the chemical composition of air?	BT 3	Applying
21.	State the purpose of air quality monitoring.	BT 2	Understanding
22.	Brief about Air Act.	BT 3	Applying
23.	List out the methods for controlling gaseous pollutants.	BT 2	Understanding
24.	What are the various adsorbents in adsorption unit?	BT 2	Understanding
25.	What is condensation?	BT 1	Remembering

PART – B			
1.	Explain various absorption units in air pollution control.	BT 4	Analyzing
2.	What is combustion? How do combustion process is applied in gaseous emission control?	BT 3	Applying
3.	Discuss the sources of pollutants and its control in a cement industry.	BT 3	Applying
4.	Explain briefly about the methods of biological air treatment system.	BT 4	Analyzing
5.	Discuss on absorption method of control of gaseous contaminants.	BT 3	Applying
6.	Briefly discuss on types of carbon adsorption system with suitable neat sketch.	BT 3	Applying
7.	Tabulate the National air quality standards for residential, Industrial and sensitive areas.	BT 4	Analyzing
8.	Define adsorption and differentiate between physical and chemical adsorption.	BT 4	Analyzing

9.	Write the list of industries specified in the schedule under Air Act 1981.	BT 4	Analyzing
10.	How London smog is different from Los Angeles Smog? Explain.	BT 3	Applying
11.	Write a short note about condensation process with examples.	BT 3	Applying
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
15.	Write a brief note on engineering design of condensation mode of air pollution control.	BT 3	Applying
16.	Explain the environmental guidelines for setting of industries.	BT 4	Analyzing
17.	Enumerate and briefly explain various sources of radioactivity in environment and write about its control measures.	BT 4	Analyzing
PART C			
1.	Write a short note on Environmental impact Assessment.	BT 5	Evaluating
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 4	Analyzing
4.	Summarize the environmental guide lines for siting of industries to ensure optimum use of natural and man-made resources in sustainable manner?	BT 5	Evaluating
5.	Suggest an air pollution control system for a cement industry and justify.	BT 5	Evaluating
UNIT V - INDOOR AIR QUALITY MANAGEMENT			
Air quality standards - Sources, types and control of indoor air pollutants, sick building syndrome and Building related illness - Town planning regulations of industries-Sources and Effects of Noise Pollution – Measurement – Standards –Control and Preventive measures.			
PART – A			
Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Describe the standards for air pollution due to automobiles.	BT 1	Remembering

2.	Define Indoor air pollution.	BT 1	Remembering
3.	Define unit of sound.	BT 1	Remembering
4.	List out various types of sound.	BT 1	Remembering
5.	Define noise pollution.	BT 1	Remembering
6.	Define the term 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 2	Applying
14.	Define sick building syndrome.	BT 1	Remembering
15.	What are the preventive measures of noise pollution.	BT 3	Applying
16.	How many decibels can the human ear handle?	BT 3	Applying
17.	What are the effects of noise on human health?	BT 3	Applying
18.	Demonstrate the most common sources of Noise pollution?	BT 3	Applying
19.	Memorize the laws regarding noise pollution?	BT 1	Remembering
20.	List out the control and preventive measures of noise pollution.	BT 3	Applying
21.	What is L_N and L_{eqn}?	BT 1	Remembering
22.	State the noise standards.	BT 2	Understanding
23.	What are the factors influencing the intensity of traffic noise?	BT 2	Understanding
24.	What is sound pressure level?	BT 2	Understanding
25.	What are the various noise sources?	BT 2	Understanding
PART – B			
1.	Explain with examples how air pollution affects building material.	BT 4	Analyzing
2.	Explain the air pollution control acts and regulation in India.	BT 4	Analyzing
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:20mpa.What is average sound level?	BT 3	Applying

4.	Explain in briefly the major factor and action that may help in noise abatement in a modern society.	BT 4	Analyzing
5.	(i) Differentiate between continuous, intermittent and impulsive noise. (7) (ii) 50dB (A) noise lasting for 55 minutes is followed by 90dB(A) noise lasting for 5 minutes. What is Leq of this noise? (6)	BT 3	Applying
6.	How could noise control be achieved at the source by design?	BT 4	Analyzing
7.	Explain the control methods and preventive measures undertaken for noise pollution.	BT 4	Analyzing
8.	Discuss in brief the various sources of noise, and their typical noise levels, in a modern society.	BT 3	Applying
9.	State and discuss the various sources of noise pollution.	BT 5	Evaluating
10.	Explain how the noise exposure causes ill effects on human.	BT 4	Analyzing
11.	Demonstrate pollution control measures in a thermal power plant.	BT 3	Applying
12.	Explain the air pollution control efforts made in our country.	BT 4	Analyzing
13.	Explain the mechanism by which hearing damage occurs.	BT 4	Analyzing
14.	List out the air pollutant sources and control measures carried out in petroleum refining unit.	BT 3	Applying
15.	Explain noise control methodologies	BT 4	Analyzing
16.	How could noise control measures achieved by noise pollution control act.	BT 3	Applying
17.	Explain the Noise assessment and Evaluation associated with noise pollution studies?	BT 4	Analyzing
PART – C			
1.	Suggest an air pollutant control plan for Chennai metropolitan city.	BT 4	Analyzing
2.	Explain in detail about the effect on Taj Mahal due to air Pollution	BT 4	Analyzing
3.	(i) What are the sources of noise? How noise become a pollution problem? (ii) "Control of noise at source"-Discuss in detail.	BT 4	Analyzing
4.	Recommend an air pollutant control plan for Delhi.	BT 5	Evaluating
5.	List out the air pollutant sources and control measures	BT 5	Evaluating

| | carried out in petroleum refining unit. | | |