CE8005-AIR POLLUTION AND CONTROL ENGINEERING

IMPORTANT QUESTIONS AND QUESTION BANK

UNIT I - INTRODUCTION

2-Marks

1. Write briefly on Climate change?
2. Define primary and secondary air pollutants?
3. What is pollution quality Index?
4. Write the methods of air quality sampling?
5. What is ozone layer depletion?
6. With a neat sketch show the different layers of atmosphere?
7. How do you classify air pollutants?
8. List the various elements of atmosphere?
9. Name any two effects on plants and also pollutants responsible?
10. What are the effects of air pollutants on human health and property?

Part-B

1. Discuss about the air pollutants that contribute climate change?
2. Enumerate the steps to be taken to control air pollution in India?
3. Distinguish among macroscale, mesoscale and microscale atmospheric motions?
4. Write the sources and classification of air pollutants?
5. Explain in detail about the characteristics of air pollution?
6. Discuss in detail about the effects of air pollution on human beings, animals and vegetation?
7. Briefly discuss the various sampling techniques involved in air pollution study?
8. How is air pollutants classified? What are the different sources of air pollutants? Give examples?
9. How is high volume air sampler used for ambient air quality sampling? Explain?
10. Explain the causes of “Ozone layer depletion” with necessary equations?
11. Write a note on greenhouse gases? Explain their benefits and ill effects on global environment?
12. Discuss about the pollutants responsible for global warming with their source and impacts?
13. Explain with neat sketch about the structures of atmosphere?
14. Mention and explain the categories of air quality index?
15. Describe the method of analysis for oxides of nitrogen?

UNIT II – METEOROLOGY

2-Marks

1. Mention two effects of air pollution on meteorological conditions?
2. What are the types of wind rose diagram?
3. Define lapse rate?
4. Define adsorption and absorption?
5. Write the primary meteorological parameters that influence air pollution?
6. What is inversion?
7. What are the assumptions involved in Gaussian Dispersion model?
8. What are Wind roses? State uses?
9. What do you mean by stack plume patterns?
10. What do you mean by meteorological model?

Part -B

1. Discuss different types of environmental lapse rate?
2. Discuss the atmospheric factors influencing the dispersion of air pollutants?
3. Write short notes on Atmosphere Stability and Air pollution indices?
4. Explain stack gas emission standards for different industries?
5. Explain the role of meteorological factors in the dispersion of air pollutants in the atmosphere?
6. Explain about the wind rose diagram?
7. Explain the relationship between ambient and adiabatic lapse rates and atmospheric stability?
8. How is maximum mixing depth (MMD) determined? 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^o C/100m?
9. What is adiabatic lapse rate? Discuss the types of adiabatic lapse rate?
10. Describe Diffusion theories in the context of air pollution control?
11. 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.?
12. 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?

13. Explain the significance of wind rose diagram? With a neat sketch, explain how different atmospheric conditions give rise to different kind of plume?
14. What are the assumptions in the Gaussian Model? Describe the Gaussian plume model with a neat sketch in detail? Explain the factors influencing the atmospheric dispersion of air pollutants?
15. 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 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)?

UNIT - III -CONTROL OF PARTICULATE CONTAMINANTS

2-Marks

1. Write the formula to calculate the efficiency in cyclone separators?
2. What is control efficiency?
3. Define electrostatic precipitation?
4. List out the physical criteria design consideration of wet scrubbing?
5. Mention any two control equipment for removing fine particulate matters?
6. State the two broad methods for controlling the gaseous pollutants?
7. What are the components of Electrostatic Precipitators?
8. Name any four principles by which particulates removal is carried out?
9. What are particulates removal mechanisms in filters?
10. What are the advantages of scrubbers?

Part-B

1. Explain the spray Chambers with a neat sketch?
2. Explain the various methods of filter cleaning with neat sketches?
3. What are the Advantages and Disadvantages of electro static precipitators? 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?

4. Explain with neat sketches about the principle and working of Cyclone Separator?
5. Explain with a neat sketch of spray tower wet scrubber?
6. Write short notes on settling chamber?
7. What is bag house filter? How it works? What are the operational problems involved?
8. Explain the working principle of cyclone scrubber with a neat sketch?
9. Explain the self cleaning properties of the environment?
10. Derive the expression for the minimum size of particle that can be removed in gravity settling?
11. List the advantages and disadvantages of cyclone separator and also mention their industrial application?
12. Explain with neat sketch the working principle of electro static precipitator with its advantage and disadvantage?
13. Explain in detail about gravitational settling chambers with neat sketch? Write a brief note about Gas particle Interaction?
14. Explain the air pollution control efforts made in our country?
15. Make a note on air pollution control by process change and raw material change?

UNIT IV - CONTROL OF GASEOUS CONTAMINANTS

2-Marks

1. Mention the environmental legislation for air pollution control?
2. How the gaseous pollutants can be controlled?
3. Differentiate adsorption and absorption?
4. What do you understand by biofilter?
5. Define air quality monitoring?
6. What is the limit prescribed for particulate matter in residential area by Pollution Control board?
7. Define absorption as it relates to air pollution control devices?
8. Name the equipment that uses the principle of absorption for the removal of gaseous pollutant?
9. What are environmental friendly fuels?
10. What are the types of condensation system?

Part-B

1. Explain how do you control the emission of NOx by the following treatment methods? (i) Absorption by H_2SO_4 (ii) Absorption by Magnesium Hydroxide (iii) Adsorption by Solids?
2. Write the general principle involved in absorption? Explain the criteria to achieve high performance in gas absorption equipments?
3. Discuss the sources of pollutants and its control in

a cement industry?

4. Explain briefly about the methods of biological air treatment system?
5. Discuss on absorption method of control of gaseous contaminants? Write a brief note on engineering design of condensation mode of air pollution control?
6. Define adsorption and differentiate between physical and chemical adsorption?
7. Explain How London smog is different from Los Angeles smog?
8. Write a short note about condensation process with examples?
9. Write a short note about Incineration process with sketches?
10. Explain briefly about the bio-filters?
11. Write a brief note about control and monitoring of gaseous pollutants on environment?
12. Write a short note on Environmental impact Assessment?
13. Compare the functions of Central and State Pollution Control Board in the area of air pollution control?
14. Explain what do you understand by air quality standards and air quality monitoring?
15. What are the environmental guide lines for siting of industries to ensure optimum use of natural and manmade resources in sustainable manner?

UNIT V – INDOORAIRQUALITYMANAGEMENT

2-Marks

1. Write the standards for air pollution due to automobiles?
2. Define Indoor air pollution?
3. Define unit of sound?
4. Define noise pollution?
5. Define the term HTL?
6. Estimate the sound pressure level resulting from two sources having levels of 70dB and 82 dB?
7. What are the noise control strategies?
8. Identify the primary sources of environmental noise?
9. What are the various indoor air pollutants?
10. How many decibels can the human ear handle?

Part-B

1. Explain with examples how air pollution affects building material?
2. Explain the air pollution control acts and regulation in India?
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?

4. Explain in briefly the major factor and action that may help in noise abatement in a modern society?
5. Differentiate between continuous, intermittent and impulsive noise? 50dB (A) noise lasting for 55 minutes is followed by 90dB(A) noise lasting for 5 minutes. What is Leq of this noise?
6. Explain the control methods and preventive measures undertaken for noise pollution?
7. Discuss in brief the various sources of noise, and their typical noise levels, in a modern society?
8. Explain how the noise exposure causes ill effects on human?
9. Make a note on pollution control measures in a thermal power plant?
10. Explain the air pollution control efforts made in our country?
11. Explain the mechanism by which hearing damage occurs?
12. List out the air pollutant sources and control measures carried out in petroleum refining unit?
13. Suggest an air pollutant control plan for Chennai metropolitan city?
14. Explain in detail about the effect on Taj Mahal due to air Pollution?
15. Suggest an air pollutant control plan for Delhi?