Code : 011755

B.Tech.7th Semester Special Examination,2016

Air Pollution Engineering

Time : 3 hours *Full Marks : 70*

Instructions :

*(i) There are **NINE** questions in this paper.*

*(ii) Attempt **Five** question in all.*

*(iii) **Questions No.1** is compulsory.*

(iv) The marks are indicated in the right hand margin.

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1. Attempt any **Seven** parts of this question. Select correct answer to the following. (2×7=14)

I. Which of the following is an organic gas?

a. Hydrocarbons

b. Aldehydes

c. Ketones

d. Ammonia

II. The major contributor of carbon monoxide is

a. Motor vehicle

b. Industrial processes

c. Stationary fuel combustion

d. None of the above

III. Fugitive emissions consist of

a. Street dust

b. Dust from construction activities

c. Dust from farm cultivation

d. All of the above

IV. Ozone is formed in the upper atmosphere by a photochemical reaction with

a. Ultra violet solar radiation

b. Infra red radiation

c. Visible light

d. All of the above

V. Which of the following is an air pollutant ?

a. Nitrogen

b. Carbon dioxide

c. Carbon monoxide

d. Oxygen

VI. Which of the following on inhalation dissolved in the blood haemoglobin more rapidly than oxygen?

a. Sulphur dioxide

b. Carbon mono-oxide

c. Ozone

d. Nitrous oxide

VII. Smog is:

a. A natural phenomenon

b. A combination of smoke and fog

c. Is colourless

d. All of the above

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VIII. The major photochemical oxidant is:

a. Ozone

b. Hydrogen peroxide

c. Nitrogen oxides

d. Peroxyl Acetyl Nitrate (PAN)

IX. Which of the following devices is suitable for the removal of gaseous pollutants?

a. Cyclone separator

b. Electrostatic precipitator

c. Fabric filter

d. Wet scrubber

X. Taj Mahal at Agra may be damaged by:

a. Sulphur dioxide

b. Chlorine

c Hydrogen

d. Oxygen

2. (a) Enumerate the natural and artificial sources of the pollutants; NO_x and CH_4. 4

(b) Write the effects of CO and SOx on human and materials. 4

(c) Define photochemical oxidants. Explain the formation of PAN. 6

3. (a) Discuss the causes of acid rain. Enumerate the various effects of the acid rain. 7

(b) What do you mean by Green House Effects? 7

4. (a) Explain in detail about the Primary Air Pollutants and Secondary Air Pollutants. 7

(b) The average daily concentration of sulfur dioxide is observed to be 415 μ g/m^3 at 25°C and 1 atm at main road of a city in India. What is the concentration in ppm? 7

5. (a) Draw the neat sketch of Gravity Settling chamber for particulate collection and describe the mechanisms of collection. 7

(b) Consider a plate type collector with an overall spacing of 23 cm and an applied voltage of 50 kV. The mean gas velocity through the collector is 1.5 m/s. Estimate the collecting plate length required for a collection efficiency of 100% for 0.5 μ m particles at 420°K. Ignore the Cunningham correction factor. Assume dielectric constant for the particle is 4. *(Assume Viscocity of gas, μ g=0.067 kg/m/hr)* 7

6. (a) Explain the dusts, smokes, mists, fumes, and vapors. 7

(b) The exhaust gas from an auto rickshaw contains 1.5% by volume of CO. What is the concentration of CO in microgram per cubic meter at 25°C and 1 atm. 7

7. (a) Write the objectives of National Ambient Air Quality Standards. 7

(b) Write the National Ambient Air Quality Standards for "criteria air pollutants". 7

8. Explain the transport theory of pollutants based on eddy diffusion concept. 14

9. (a) A fabric filter is to be constructed using bags that are 0.3 m in diameter and 6.0 m long. The bag house is to receive $10 m^3/s$ of air, and the appropriate filtering velocity has been determined to be 2.0 m/min. Determine the number of bags required for a continuous cleaned operation. 7

(b) Explain with help of sketch the working principle of Bag house filter for the collection of particulate matter from gases. 7

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