Code : 011755

B.Tech 7th Semester Exam., 2020

AIR POLLUTION ENGINEERING

Time : 3 hours *Full Marks* : 70

Instructions :

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

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

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Choose the correct answer of the following (any *seven*) : 2×7=14

(a) Which of the following particles is called the particulate pollutant?

(i) Ozone

(ii) Radon

(iii) Fly ash

(iv) Ethylene

(b) Which of the following diseases is/are caused by smog?

(i) Rickets

(ii) Bronchitis

(iii) Breathing problems

(iv) All of the above

(c) Which of the following gases has the highest affinity for blood haemoglobin?

(i) Carbon dioxide

(ii) Oxygen

(iii) Carbon monoxide

(iv) Nitrogen

(d) The permissible concentration of PM 10 in the air is

(i) 60 $\mu g/m^3$

(ii) 40 $\mu g/m^3$

(iii) 50 $\mu g/m^3$

(iv) 20 $\mu g/m^3$

(e) Two air pollution control devices that are usually used to remove very fine particles from the flue gas are

(i) cyclone and venture scrubber

(ii) cyclone and packed scrubber

(iii) electrostatic precipitator and fabric filter

(iv) settling chamber and tray scrubber

(f) SO_x in atmosphere is measured by

(i) non-dispersive infrared analyzer

(ii) West and Gaeke method

(iii) sodium arsenate method

(iv) gas chromatography

(g) The atmospheric layer closest to the earth surface is the

(i) mesosphere

(ii) stratosphere

(iii) thermosphere

(iv) troposphere

(h) Pre-cursors to photochemical oxidants are

(i) NO_x, VOCs and sunlight

(ii) SO_2, CO_2 and sunlight

(iii) H_2S, CO and sunlight

(iv) SO_2, NH_3 and sunlight

(i) Particulate matter (fly ash) carried in effluent gases from the furnaces burning fossil fuels are better removed by

(i) cotton bag house filter

(ii) electrostatic precipitator (ESP)

(iii) cyclone

(iv) wet scrubber

(j) The maximum dispersion of pollutants in atmosphere occurs when

(i) environmental lapse rate is equal to adiabatic lapse rate

(ii) environmental lapse rate is less than adiabatic lapse rate

(iii) environmental lapse rate is greater than adiabatic lapse rate

(iv) None of the above

2. *(a)* How is London smog different from Los Angeles smog? Explain.

   (b) Define dust, smokes, mists, fumes and vapors. 7+7=14

3. *(a)* Explain with a neat sketch, how plume behaves in different atmospheric stability conditions.

   (b) Define wind rose. Explain the importance of wind rose in air pollution studies. 7+7=14

4. *(a)* Write the primary meteorological parameters that influence air pollution.

   (b) Describe diffusion theories in the context of air pollution control. 7+7=14

5. *(a)* List the advantages and disadvantages of cyclones separator and also mention their industrial applications.

   (b) Explain with a neat sketch spray tower wet scrubber. 7+7=14

6. *(a)* What are the basic considerations of air sampling? Discuss.

   (b) Explain the procedure for the collection of suspended particulates by high-volume sampler. 7+7=14

7. What are the advantages and disadvantages of electrostatic precipitators? Design a tubular ESP to treat 10000 m^3/hr of a gaseous stream from a paper mill for an efficiency of 90%. Assume an effective migration velocity of 0·075 m/sec. 14

8. *(a)* Explain air pollution due to gasoline and diesel engines.

   (b) What are the causes of acid rain? Discuss their remedial measures. 7+7=14

9. Write short notes on any *four* of the following : 3½×4=14

   (a) Inversion

   (b) Lapse rate

   (c) Electrostatic precipitator (ESP)

   (d) Meteorological models

   (e) Bhopal Gas Tragedy

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