Total number of printed pages – 7 **B. Tech**

CPEV 7306

Sixth Semester Examination – 2008

FUNDAMENTAL OF AIR POLLUTION

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions in brief : 2 ×10

   (a) List the pollutants and their sources responsible for ozone layer depletion.

   (b) Name the air pollutant responsible for creating the following pollution episodes : Bhopal Gas, London smog, Chernobyl disaster.

   (c) Why some pollutants are known as primary pollutants whereas other pollutants are known as secondary pollutants ? Explain with suitable examples.

   (d) What is the most common unit for the measurement of particulates as recommended by USEPA ?

   (e) What is the heat island effect ?

   (f) What are the important parameters responsible for attenuation of noise pollution ?

   (g) Name the acts and their objectives of the acts enacted for the control of air pollution in India.

   (h) Briefly discuss the adverse effect of inhaling CO on blood cells of human.

(i) What is wind rose diagram and where it is used ?

(j) What are the parameters responsible for developing the plume rise above the stack ?

2. (a) Discuss four important layers of the atmosphere with the sketch of a temperature profile of the atmosphere. 4

(b) Briefly discuss the composition of atmosphere. 4

(c) Determine the saturation concentration of O_2 at 20 °C at one atmosphere. (Take Henry's constant at 20 °C, $K_h = 4.01 \times 10^4$ atm/mole) 2

3. (a) A sample of air analysed at 0 °C and 1 atm pressure is reported to contain 9 ppm of

carbon monoxide. Determine the equivalent CO concentration in $\mu g/m^3$. 3

(b) Discuss the pollutant, and adverse effects of automobile pollution. Describe the sampling and analysis of smoke comes from diesel engines. 3+4

4. (a) Discuss the adverse effects of following types of air pollution on human health, vegetation and materials : 5

(i) Particulates

(ii) PAN & PBN.

(b) Discuss the procedure of sampling and analysis of SO_2 in the local atmosphere or inside a coal fired power plant. 5

5. Discuss the following plume behaviours with the help of sketches (ELR vs DALR) and stability conditions (any *five*) : 2×5

(i) Looping

(ii) Coning

(iii) Neutral

(iv) Fanning

(v) Fumigating

(vi) Lofting.

6. (a) Write the equations and the meaning of associated terms used in Gaussian dispersion model in the following cases : 5

Case-I Point source at Ground level

Case-II Point source at elevation H above the ground level with reflection.

(b) Emission of SO_2 at the rate of 160 g/sec from a stack with an effective height of 60 m and the wind speed at the stack height is 6 m/sec and the stability class is 'D' the ground level concentration along the centre line at a distance of 500 m from the stack. Assume for class 'D' the σy and σz are 36 and 18.5 m respectively at a distance of 0.5 KM. 5

7. (a) Define the noise pollution and its units. Also discuss the noise criteria and sound intensities generated by the following types of noise environment : 2×3

(i) Car

(ii) Lorry

(iii) Jet engine.

(b) Differentiate radiation inversion with subsidence inversion. 4

8. Write short notes on the following (any *four*) : 2.5×4

(i) Photochemistry in the atmosphere

(ii) Global warming

(iii) Air pollution index / indices

(iv) Guidelines for fixing stack height

(v) Pasquill – Gifford atmospheric stability classifications

(vi) Effect of air pollutants on meteorology, land / sea breeze effects.

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