



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech (CE-NEW)/SEM-8/CE-801/2/2010**

**2010**

**ENVIRONMENTAL POLLUTION & CONTROL**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) Pollution by depletion of ozone layer is caused due to the reaction of O<sub>3</sub> with
  - a) CO<sub>2</sub>
  - b) Cl
  - c) SO<sub>2</sub>
  - d) None of these.
- ii) The poisonous gas responsible for Bhopal Gas tragedy of India was
  - a) Sulphur dioxide
  - b) Methyl isocyanide
  - c) Laughing gas
  - d) none of these.
- iii) During temperature inversion in atmosphere, air pollutants tend to
  - a) accumulate above inversion layer
  - b) accumulate below inversion layer
  - c) disperse laterally
  - d) disperse vertically.



- iv) Important gas pollutants contributing to acid rains are
- a)  $\text{SO}_2$  &  $\text{NO}_x$                       b)  $\text{CO}_2$  &  $\text{H}_2\text{S}$
- c)  $\text{NO}_x$  &  $\text{O}_3$                       d) none of these.
- v) Device used to control gaseous as well as particulate pollutants in the industrial emission is called
- a) Cyclone                      b) Spray tower
- c) Dynamic precipitator      d) Fabric filter.
- vi) The permissible SPM standard in industrial areas in India is
- a)  $100 \mu\text{g}/\text{m}^3$                       b)  $200 \mu\text{g}/\text{m}^3$
- c)  $500 \mu\text{g}/\text{m}^3$                       d)  $1000 \mu\text{g}/\text{m}^3$ .
- vii) The temperature gradient of ambient air is called
- a) Adiabatic lapse rate
- b) Super adiabatic lapse rate
- c) Environmental lapse rate
- d) Dry adiabatic lapse rate.
- viii) Major photochemical oxidant is
- a) hydrogen peroxide              b)  $\text{O}_3$
- c)  $\text{NO}_x$                       d) PAN.
- ix) The specified ambient air quality standard for  $\text{NO}_2$  is about  $100 \mu\text{g}/\text{m}^3$ , which in ppm is approximately
- a) 0.01                      b) 0.05
- c) 0.1                      d) 0.5.

- GROUP – B**

Answer any *three* of the following.  $3 \times 5 = 15$

- 8025



4. What do you mean by Ozone depletion and Acid rain ? Give chemical reactions to support your answer.
5. Write a short note on the impact of mining on the surrounding environment.
6. Define sound intensity, sound pressure and sound power level. How are the three levels related ?
7. Sketch the following plume phenomena and discuss each sketch in relation to dry adiabatic lapse rate :
  - a) Looping
  - b) Fanning
  - c) Trapping
  - d) Lofting
  - e) Fumigating
  - f) Coning.
8. What are the dry adiabatic lapse rate and the wet adiabatic lapse rate ? Explain why they differ.
9. Distinguish between the following :
  - a) Primary and secondary air pollutants.
  - b) Stationary and mobile sources of air pollutants.



**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

10. a) What do you mean by octave band analysis of noise ? 2
- b) A 70 dB (A) lasting for 35 minutes is followed by 80 dB (A) and 60 dB (A) lasting for 15 minutes and 10 minutes respectively. Calculated of Leq of noise. 3
- c) While recording a weighted rated sound level, 4 readings were taken at a site at a difference time of a day. The readings have been found to be 30 dB (A), 60 dB (A), 65 dB (A), 40 dB (A). What is the average sound level ? 3
- d) Traffic noise data is shown in the table below :

Time (s)	Sound pre-level ( 120 dB )	A ( +corrected )
10	65	+5
20	68	–6
30	70	+3
40	75	–3
50	85	–4
60	90	–5
70	70	0
80	75	+1
90	70	+4
100	75	+5
110	85	+3
120	90	+1

Calculate Leq based upon the value determined by the comments on the area. 4

- e) Derive the expression :  $L_w = L_i + 10 \log_{10} A$ , where the notations have their usual meanings. 3



11. Describe the pollution characteristics and suggested treatments for any *five* of the following industries : 5 × 3
- a) Dairy
  - b) Distillery
  - c) Fertilizers
  - d) Oil Refineries
  - e) Pulp and Paper Mills
  - f) Petrochemicals
  - g) Pharmaceutical
  - h) Sugar
  - i) Tannery
  - j) Textile.
12. Explain the concept of EIA ( Environmental Impact Assessment ). Describe the probable environmental impacts of a thermal power plant and a mining industry. 3 + 6 + 6
13. What do you understand by atmospheric dispersion ? Write down the equation for determining ground level concentration of pollutant. Where does the maximum ground level concentration occur ? A thermal power plant burns coal at the rate of 7.5 tonnes/hr. and discharges the flue gases through a stack having effective height of 95 m. The coal has a sulphur content of 4.6%. The wind velocity at the top of the stack is 8 m/s. The atmospheric conditions are slightly unstable.
- a) Determine the ground surface concentration of  $\text{SO}_2$  and the distance from the site at which this occurs.
  - b) Determine the ground surface concentration of pollutants at a distance 2000 m down wind at centre line of the plume. [ Provide  $\Delta_y$  vs  $x$  and  $\Delta_z$  vs  $x$  for different atmospheric stabilities ] 5 + 10



14. Tabulate the pollution characteristics of fertilizer and dairy.
15. a) Determine maximum ground level concentration when a power plant burns 5.45 tonnes of coal per hour and discharges the combustion products through a stack that has an effective height of 75 m. The coal has a sulphur content of 4.2%, and the wind velocity at the top of the stack is 6 m/sec. The atmospheric conditions are moderately to slightly stable. Determine the maximum ground level concentration of  $\text{SO}_2$  and the distance from the stack at which the maximum occurs.
- b) Calculating effective stack height, determine the effective height of a stack given the following data :
- i) Physical stack is 203 m tall with 1.07 m inside diameter.
  - ii) Wind velocity is 3.56 m/sec.
  - iii) Air temperature is  $13^\circ \text{C}$ .
  - iv) Barometric pressure is 1000 millibars.
  - v) Stack gas velocity is 9.14 m/sec.
  - vi) Stack gas temperature is  $149^\circ \text{C}$ . 10 + 5
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