INDIAN INSTITUTE OF TECHNOLOGY

Date: FN / AN **Time :** 3 Hrs. **Full Marks :** 50 No. of Students : 161

Autumn Semester, 2011 **Deptt. : AE, CE, MF** Sub No. **EV20001**

B.Tech (H) **Subject Name:** Environmental Sciences

Instructions: This question paper is for **Section-2** of Environmental Science and it is not applicable for other sections. Provide answers to questions in each part together.

Part- A

1. (a) What is EIA? What are the steps involved in conducting a systematic EIA study for a developmental project? **[4]**

(b) Distinguish between

i. Single-stage and two-stage precipitators.
ii. Dry and wet precipitators.
iii. Primary and secondary air pollutants. **[3]**

(c) What are advantages and disadvantages of settling chambers? Give their applications. **[2]**

2. Suppose that within a square city, 15 km on a side, there are 200, 000 cars on the road, each being driven 30 km between 4 pm and 6 pm, and each emitting 3 g/km of CO. It is a clear winter evening with a radiation inversion that restricts mixing to estimated 20.0 m, and the wind is bringing clean air in at a steady rate of 1.0 m/s along an edge of the city. Use a box model to estimate the CO concentration at 6 pm if there was no CO in the air at 4 pm, and the only source of CO is cars. Assume that CO is conservative and that there is complete and instantaneous mixing in the box. **[5]**

3. Carbon monoxide (CO) is present in standard atmospheric air at a concentration of 50 ppm. Calculate the equivalent concentration in terms of mass fraction (w_p), and in milligram per cubic meter at 25^0 C at 1 atm. **[4]**

4. The maximum CO concentrations normally measured in downtown Salt Lake City (early 1990s) are about 3500 $\mu g/m^3$. These values occur during strong inversions, for which we may estimate the values of u and H as 0.5 m/s and 100 m, respectively. The background concentration for this situation is estimated to be 500 $\mu g/m^3$. The downtown area of Salt Lake City may be approximated as a 3-km by 3-km square. Estimate the emission density (g /s. m^2) for CO for downtown Salt Lake City. **[4]**

Part-B

5. (a) Describe energy pyramid, pyramid of number and pyramid of biomass in the ecosystem. Also, describe which pyramid(s) cannot be inverted and why? [2]

   (b) Describe about the Nitrogen Cycle in the ecosystem. [2]

6. (a) What do you mean by impact assessment? Why do we need it? [2]

   (b) Define biodiversity index and ethnic index? [1]

   (c) What is phase-I and Phase-II environmental impact assessment? [1]

7. What do you mean by screening and scoping in environmental impact assessment? [2]

Part-C

8. Effective solid waste management of an area is depending on the collection, segregation and disposal of the wastes. Briefly outline the methods of collection of waste from various sources. What is the 3-R principle that we have to consider for solid waste management? Describe one reuse of waste in industry? [6]

9. Composting of solid waste is considered as one of the preferred treatment techniques of waste. Outline the composting methods. Enlist the factors that might influence composting. What are advantages and disadvantages of incineration? [6]

10. What steps can you suggest to restrict soil erosion? Deforestation is considered as one of serious environmental problem and it leads to soil pollution and other environmental degradation. Enlist the major causes of deforestation? [6]

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