

**B.E. (Civil) Part III 6<sup>th</sup> Semester Final Examination, 2009-10**  
**ENVIRONMENTAL ENGINEERING - II (CE 605)**

3 hours

Full Marks: 70

*Use separate Answer-script for each half.*  
*TWO (2) marks are reserved for neatness in each half.*

**FIRST HALF**

**Answer ANY THREE (3) questions.**

(a) With suitable sketch, explain the principle and operation of cyclone separator and electrostatic precipitator.

(b) With sketch, explain the operation of any device for control of gaseous pollutants.

(7+4 = 11)

(a) Characterize an unstable atmosphere for atmospheric dispersion of pollutants? When the plume emitting from a stack takes the 'fanning' shape? What is effective stack height?

(b) 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 percent and the wind velocity at the top of the stack is 6.0 m/s. The atmospheric conditions are moderately to slightly unstable. Determine the ground level concentration at a location which is 3.0 km downwind and 0.4 km crosswind on any side of the centerline.

(5+6=11)

(a) What pollutants are monitored in vehicular exhaust as per Bharat stage IV norms? How the catalytic converters are helpful in reducing the automotive pollution?

(b) As per the CPCB norms, the ambient air quality standard for SO<sub>2</sub> is 50 ug/m<sup>3</sup> (annual average). Express this standard in ppm. How the 'annual average' concentration is estimated?

(c) What is known as **PM<sub>i</sub>**? How can it be estimated?

(4+4+3=11)

(a) What are primary and secondary air pollutants? Give examples of point source and area sources of air pollution.

(b) Indicate the sources and health effects of carbon monoxide.

(c) What pollutants are responsible for generation of photochemical oxidants in the atmosphere? Name some of the photochemical oxidants.

(4+4+3=11)

(a) Mention the ozone catalytic cycles that are naturally occurring in the stratosphere. How chlorofluorocarbon molecules may expedite the ozone destruction process?

(b) Explain how presence of certain **gases** helps warming of the Earth's lower atmosphere. Which gases are responsible to cause acid rain?

(6+5=11)

**SECOND HALF**

**Answer ANY THREE (3) questions.**

(a) Why is the information on the properties of solid wastes important? List the information needed on physical and chemical composition of a solid waste sample.

(b) Show the generalized flow of materials and the generation of solid wastes in a society.

(c) Show the flow diagram of materials in a technological society.

(5+3+3=11)

7. (a) Describe and draw the interrelationship of various functional elements of a solid waste management system.  
 (b) What factors affect the MSW quantity generation rates?  
 (c) State the factors that to be considered during laying out routes. (3+3+5=11)
8. (a) Explain with sketches the two categories of MSW collection system. Show graphically the 'break-even time'.  
 (b) What is transfer station? What factors to be considered in designing of transfer station? What should be the location of transfer station? (5+6=11)
9. (a) What is leachate? How the movement of leachate can be controlled in a landfill? Show pictorially a landfill area which preventing the movement of gases and leachate.  
 (b) List the important factors that to be considered in the design and operation of solid waste landfills. (6+5=11)
10. (a) What are the principal Landfitting methods? Mention their applicability.  
 (b) State the various events that may occur when solid wastes are placed in a sanitary landfill.  
 (c) How the gas movement can be controlled or recovered in a sanitary landfill? (4+4+3=11)

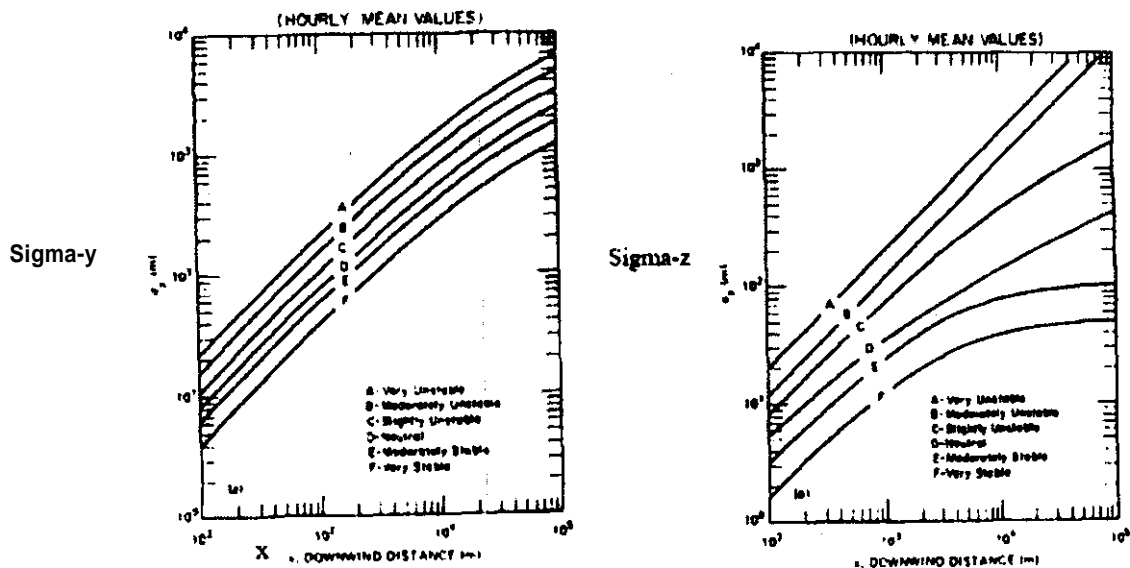


Figure Q2.