

Time - 3 hrs

Marks -80

N.B - Question no 1 is compulsory.
Solve any three questions from remaining five questions.
Assume suitable data wherever necessary.
Figures to the right indicate full marks.

Q.1 a) Discuss in detail the basic theory of Design for activated sludge process. What are biokinetic parameters? Explain along with equations evaluation of biokinetic parameters. 12

b) What are the limitations to Gaussian Plume Model. 4

c) What is the difference in epidemiological and toxicological studies? Give examples. 4

Q.2 a) A chimney with a design stack height of 250m is emitting SO₂ at a rate of 500g/s on a sunny day in June with moderate wind speed at the stack altitude. The stack diameter is 5 m, the sulphur dioxide exit velocity is 13m/s and the gas temperature of exit is 145°C, What is the plume rise for an ambient room temperature of 30°C? Calculate the ground level concentration on the plume centerline at the downwind distance of 1Km. PR=15g
U_i at reference height is 2.5m/s
A=0.295, B=0.119, P=0.986, α = 0.25 12

b) What do you understand by inversion? What are the various types of inversion? Explain in detail along with diagram. 8

Q.3 a) Show that the ratio of 2.25 day, 35 °C BOD to the 5-day 20°C BOD is approximately unity. 4

b) What is carbonaceous and nitrification demand in BOD? 4

Turn Over

- c) The town discharges $17,360 \text{ m}^3/\text{d}$ of sewage into a nearby stream. The stream has a minimum flow of $0.4 \text{ m}^3/\text{s}$, depth of 2.5m and a velocity of 5kmph. Other information pertaining to the stream and sewage are as follows. 12

	Temp ⁰ C	DO(mg/l)	BOD ₅ (mg/l)
Stream	20	8.5	10
Sewage	25	1	200

The deoxygenation constant (k_1) evaluated at $20^{\circ}\text{C}=0.35\text{d}^{-1}$. Determine the critical oxygen deficit, D_c , and its location x_c

- Q.4 a) What are advanced waste water treatments? Explain Electrodialysis in detail. 10
- b) Describe the classification of solid waste based on the content, moisture and heating value. List the potential methods for disposal of solid waste and discuss any one in detail. 10
- Q.5 a) Describe operational and constructional features of i)Centrifugal scrubber ii)Fabric filter 10
- b) What are the various treatments for hazardous waste management? Describe any two in detail. 10
- Q.6 Write short notes on any four 20
- a) Eutrophication in lakes
- b) Air and water act.
- c) Plume behavior.
- d) Adverse effects of air pollutants on vegetation
- e) Flame photometer