(3 Hours) **Marks 80**

N.B. 1 Question number ONE is compulsory
2 Attempt any THREE questions out of remaining FIVE
3 Figure to right indicate full marks

01.		**Attempt any four**	**20**
	(a)	Describe the method of air sample collection of gaseous pollutant	
	(b)	Describe the bacterial growth phases.	
	(c)	Explain noise pollution causes, consequences and abatement methods	
	(d)	Write short notes on Environmental Audit	
	(e)	What are the limitation of Gaussian Plume Model	
02.	(a)	What are the sources of solid waste? Explain any two solid waste disposal method	**10**
	(b)	Discuss in brief various methods for recovery of materials from process effluents	**10**
03.	(a)	Explain the plume behavior depending on atmospheric stability and wind turbulence	**10**
	(b)	Explain activated sludge process of secondary biological treatment with a neat diagram	**10**
04.	(a)	How is air pollutants classified? List the major types of Air pollutants. Briefly explain the dry deposition mechanism and wet precipitation mechanism of nature for removal of particulate matter	**10**

(b) The town discharges 16,365 m^3/d of sewage into a nearby stream. The stream has a minimum flow of 0.4 m^3/s, depth of 2.5 m and a velocity of 4 km/h. Other information pertaining to the stream and the sewage are as follow **10**

	Temperature ^oC	DO (mg/l)	BOD_5 (mg/l)
Stream	20	8.5	12
Sewage	25	1	200

The deoxygenation constant (k_1) evaluated at 20 ^oC is 0.35 d^{-1}.
Saturation concentration of dissolved oxygen at 21.7 ^oC is 9 mg/l.
Determine the critical time, tc, in days

05. (a) What are the various treatments for hazardous waste management? Describe any two in detail. **10**

(b) A power plant burns the coal and discharges the sulfur dioxide through a stack that has an effective height of 70 m. The wind velocity at the top of the stack is 6 m/s. The atmospheric conditions are slightly unstable. The emission rate of SO_2 is 215 g/s. Determine the ground level concentration at a distance of 3 km downwind at the center line of the plume and at a crosswind distance of 0.4 km on either side of the center line. **10**

Data: Fitted values for σ_y is 280 m and σ_z is 170 m

06. (a) Describe operational and constructional features of the flame photometer analyzer to measure stack gasses concentration release from chimney **10**

(b) The dissolved oxygen in an unseeded sample of diluted wastewater having an initial DO of 8 mg/L is measured to be 3 mg/L after 5 days. The dilution fraction is 0.03 and reaction rate constant k is 0.20 day-1. **05**

Calculate

i) 5 day BOD of the waste
ii) Ultimate carbonaceous BOD
iii) What would be remaining oxygen demand after 5 days?

(c) What are the Indian standards for ambient air quality and what pollutants are included in these standards? **05**
