(3 hours) **Marks: 80**

NB : 1. Question no. 1 is **compulsory**.
2. Attempt any **three** questions out of remaining **five** questions.
3. Assumptions made should be clearly stated.
4. Figures to the right indicate marks.

1. Write short notes on any **four**. **20**

1. a) Environmental legislation and regulations.
b) Eutrophication in lakes.
c) Isokinetic and non-isokinetic particulate sampling.
d) Classification of hazardous waste based on material properties.
e) Noise pollution causes, consequences and abatement methods.

2. a) Describe sampling and analysis of alkalinity, bacteriological measurements and suspended solids in waste water. **10**

b) Following BOD test was carried out in lab and results are tabulated as follows:- **10**

Time in Day (t)	0	1	2	3	4	5
BOD in mg/lit	0	32	56	85	105	110

Determine the reaction rate constant and ultimate BOD?

3. a) Classify the waste water treatment methods. Discuss one Primary & secondary treatment methods. **10**

b) A completely mixed activated sludge process is to be used to treat waste water flow of 1000 m^3/hr having a soluble BOD_5 of 250 mg/l. Design criteria are as follows: **10**
Y = 0.4, Θ_c = 5 days, K_d= 0.1 d^{-1}, k = 8 d^{-1} ; K_s = 75 mg/l; X = 2000 mg/l MLSS
Calculate: i) Substrate exit concentration ; ii) Volume of aeration tank iii) The F/M ratio

4. a) Define the terms **10**
a. troposphere and tropopause
b. stratosphere and stratopause
Draw a graph showing variation of temperature with altitude in each of the regions and explain why the curve appears as it does in your plot.

b) State various equations for estimation of plume rise for buoyant plumes. **10**

5 a) How are 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) Describe techniques for removal of gaseous pollutants from an effluent stream? **10**

6. a) What are the various methods employed for recovery of material from process effluent? What is its importance? Explain any two methods and its application. **10**

b) Discuss in details Gaussian plume model along with its limitations. **10**
