

IV B.Tech. I Semester Regular Examinations, November -2005
ENVIRONMENTAL ENGINEERING
(Chemical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. What are the chemical industries which emit SO_2 into the atmosphere? Discuss its effect on human health. [16]
2. What proportion of total BOD of wastewater would be utilized in five days with k_1 values of 0.115, 0.23, 0.345, 0.46 and 0.576/d. [16]
3. List the various computer models available for the dispersion of air pollutants? Describe any two models that are frequently used for the determination of the potential concentration impacts on air quality? [16]
4. (a) Explain the working, construction, and principles of electrostatic precipitator.
(b) What are the advantages and disadvantages of electrostatic precipitator. [8+8]
5. Describe the removal of sulphurdioxide by dry process using oxidatur / reduction. [16]
6. (a) Describe various types of bacteria useful in the biological waste treatment system.
(b) Explain a typical biological waste treatment system of an organic chemical industry. [8+8]
7. Explain the working of a rotating biological contactor with a neat sketch. [16]
8. Enlist important uses of ion exchange method. How it compares with neutralization. [16]

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1. What are the ill effects of land disposal of industrial effluent? Explain in detail.
[16]
2. From first principle derive an equation for I stage BOD at any time 't' having the ultimate BOD value L and reaction rate constants k_1 .
[16]
3. (a) Derive Gaussian Plume model?
(b) Discuss the limitations of the model? [8+8]
4. (a) What are the types of control equipment used for the control of particulate matter?
(b) Explain the mechanism for the removal of particulate matter using gravitational settling? [8+8]
5. Describe the removal of NO_x by una scrubbing with a neat diagram. [16]
6. (a) Explain the role of bacteria in the biological treatment of sewage.
(b) Explain the bacteriological growth curve with a neat sketch. [8+8]
7. Differentiate the suspended growth process and attached growth process with examples for wastewater treatment. [16]
8. (a) Enlist important effluents that are commonly treated.
(b) Enlist special features of tertiary treatment method. [8+8]

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1. How are industrial effluent classified based on their constituents. [16]
2. (a) In a polluted stream, there must be a minimum D.O.content for survival of aquatic life - Justify.
(b) A river, having a minimum flow of 60,000 lpm, receives sewage from a nearby city at the rate of $5000 \text{ m}^3/\text{min}$. The velocity of flow in the river is 0.12 m/sec. The BOD of the sewage at 20°C is 300 mg/l. Assume the BOD of the river as zero. Determine the quantity and point of critical DO deficit. [8+8]
3. Describe various types of chimney plume and draw the atmospheric temperature profile corresponding to its occurrence. [16]
4. Compare and contrast:
 - (a) Gravity and cyclone separators
 - (b) Wet and dry electrostatic precipitators
 - (c) Spray and packed towers
 - (d) Absorbers and Adsorbers. [16]
5. Describe the removal of No_x by una scrubbing with a neat diagram. [16]
6. (a) Describe various types of bacteria useful in the biological waste treatment system.
(b) Explain a typical biological waste treatment system of an organic chemical industry. [8+8]
7. Outline the design procedure for complete treatment of effluent from a fermentation unit based on “ Activated sludge” process. Show the overall process flow diagram of the system. [16]
8. (a) Discuss in brief ozonation and give suitable Examples of its application for pollution abatement.
(b) Discuss Chlorination process with suitable Example. [8+8]

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1. What are the ill effects of land disposal of industrial effluent? Explain in detail. [16]
2. What is meant by TOC? How is it determined? [16]
3. List the various computer models available for the dispersion of air pollutants? Describe any two models that are frequently used for the determination of the potential concentration impacts on air quality? [16]
4. (a) Explain the working principle of Electrostatic precipitator with neat sketch.
(b) What are the design parameters, advantages, disadvantages and industrial application of Electrostatic precipitator? [8+8]
5. Describe the removal of NO_x by una scrubbing with a neat diagram. [16]
6. Describe the biological effluent treatment system for an organic chemical Industry with a neat flow sheet. [16]
7. Compare and contrast standard rate and high rate trickling filters. [16]
8. Enlist various parameters and their impact on removal of Cr through reduction precipitation method, Enumerate merits and demerits of the process. [16]
