

2125  
Bachelor of Science (FYUP), Third Semester  
Industrial Chemistry  
Paper - Industrial Chemistry and Environmental Sustainability

Time allowed: 3 Hours

Max. Marks: 67

**NOTE:** Attempt four questions in all, including Unit - IV which is compulsory and selecting one question from each Unit I-III.

x-x-x

UNIT-1

- Q1 (i). Classify air pollutants based on chemical composition and state of matter. (4)  
(ii). How does air pollution affect human health, aquatic life and plants? (6)  
(iii). Define plume and discuss different types of plume behaviour. (6)
- Q2 (i). Discuss the principles, construction and working of wet scrubbers. Also give the advantages and disadvantages of this technique. (8)  
(ii). How can air pollution due to oxides of nitrogen be controlled? (4)  
(iii). How does fabric filter remove the particulates from carrier gas? Give the disadvantages of this technique. (4)

UNIT-2

- Q3 (i). Classify water pollutants on the basis of their source of origin and discuss each category. (5)  
(ii). What is the impact of water pollution on human and aquatic life? (4)  
(iii). Explain the following:  
a) BOD (3)  
b) COD (3)  
(iv). Discuss the use of Trickling filters in waste water treatment. (4)
- Q4 (i). Discuss the method for Sludge treatment and disposal. (5)  
(ii). Discuss activated sludge process in secondary waste water treatment and compare with trickling filters. (5)  
(iii). Which physical water quality parameters must be tested for good water quality analysis? (3)  
(iv). What are facultative and aerated ponds? How are they used for waste water treatment? (3)

UNIT-3

- Q5 (i). What is solid waste? Discuss the types of Solid wastes, their sources and method of collection. (5)  
(ii). Discuss the sanitary landfill method for solid waste disposal with proper diagrams. (5)

(2)

(iii). What is hazardous waste? List its characteristics and categorize the hazardous waste. (4)

(iv). What are the toxic effects of Lead contamination? (2)

Q.6 (i). Define incineration and its discuss its primary purpose. What are the components of an incinerator plant? (5)

(ii). Describe the hazardous waste management strategy. (5)

(iii). Discuss the impact of heavy metal toxicity in plants and animals. (4)

(iv). What is composting? How is it used in the disposal of solid waste? (2)

#### UNIT - 4

Q.7 High BOD value in a water sample indicates:

- A. Water is highly Oxygenated
- B. Water is free from Organic Pollutants.
- C. Water contains a large amount of biodegradable organic matter.
- D. Water contains no microbial activity.

Q.8 Tertiary treatment in Waste water management is primarily used to:

- A. Remove large suspended solids.
- B. Remove dissolved nutrients and remaining impurities.
- C. Allow settling of Sludge.
- D. Oxidize organic matter biologically.

Q.9 Which of the following statements about Water hardness is incorrect?

- A. Permanent hardness cannot be removed by boiling.
- B. Temporary hardness is mainly due to Bicarbonates of  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$
- C. Ion Exchange resins can remove both temporary and permanent hardness.
- D. EDTA titration specifically measures only temporary hardness.

Q.10 Which of the following is a major disadvantage of using Incinerators for solid waste management?

- A. Reduction in waste volume.
- B. Requirement of large land area.
- C. Emission of toxic gases and Particulates.
- D. Production of usable heat energy.

Q.11 Which of the following is NOT a characteristic of sanitary landfill?

- A. Daily covering of waste with soil.
- B. Uncontrolled dumping at the site.
- C. Gas collection systems for Methane.
- D. Controlled dumping at the site.

(3)

- Q.12 The most effective method for removing heavy metals like  $Pb^{2+}$  and  $Cd^{2+}$  from waste water is:
- A. Sedimentation
  - B. Ion Exchange
  - C. Simple Filtration
  - D. Aeration
- Q.13 Ozone depletion is caused by:
- A. Carbon dioxide
  - B. Sulfur Dioxide
  - C. Oxygen
  - D. Chlorofluorocarbons
- Q.14 Which method is specifically designed to remove particulate matter from gas stream using electric field?
- A. Scrubbing
  - B. Adsorption
  - C. Baghouse filter
  - D. Electrostatic precipitator
- Q.15 Coning plume occurs under which conditions?
- A. Super Adiabatic
  - B. Sub Adiabatic
  - C. Neutral
  - D. Inversion

(9x1mark)

Q.16 What is the role of bacterial population dynamics in secondary waste water treatment?

Q.17 What is meant by Waste minimization?

Q.18 What are the sources of heavy metal pollution?

Q.19 Define Lapse rate?

Q.20 What is Photochemical smog?

(5x2marks)