GUJARAT TECHNOLOGICAL UNIVERSITY

BE 4 SEMESTER – OLD PAPER – S22 TO S26 – QUESTION BANK

Subject Name & Code: Pollution Control & Safety Management - 3140509

Chapter 1: Impact of man on environment; ecological systems and pollution, hydrologic and nutrient cycles; types/sources/causes/effects of environmental pollution

Repeated Questions:

1. Natural Cycles (Nitrogen, Hydrological & Nutrient):

- **Q.** Discuss nitrogen cycle in nature with neat diagram and give its effect on environment. / What do you understand by Fixation of Nitrogen? Describe with neat diagram of Nitrogen cycle. [Diagram required – refer to the original question paper] **(U3, 7 Marks; SUMMER 2025, 7 Marks; WINTER 2025, 7 Marks)**
- **Q.** Explain Hydrological cycles and Nutrients cycles. / State the various natural cycles in nature and discuss any one in detail. **(SUMMER 2022, 7 Marks OR; WINTER 2022, 7 Marks OR; WINTER 2025, 7 Marks)**
- **Q.** Explain hydrological cycle with neat diagram / Write a short note on Hydrological Cycle. [Diagram required – refer to the original question paper] **(WINTER 2024, 4 Marks; SUMMER 2025, 3 Marks OR)**

2. Types, Sources, Causes & Effects of Pollution:

- **Q.** Explain the types of environmental pollution through chemical industry. / Briefly explain various types of environmental pollution in general. **(SUMMER 2022, 7 Marks; WINTER 2022, 7 Marks; SUMMER 2023, 4 Marks)**
- **Q.** What are the sources and causes of environmental pollution? / Short note on sources and causes of environmental pollution. / Enlist the Sources of environmental pollution in chemical industries. What are the major impacts of chemical industries on the environment? **(U3, 7 Marks; SUMMER 2022, 7 Marks; SUMMER 2023, 7 Marks; WINTER 2025, 7 Marks OR; SUMMER 2026, 7 Marks)**
- **Q.** Discuss effects of pollution on environment / Write a short note on effect of pollution on environment. **(U3, 3 Marks; SUMMER 2022, 4 Marks; SUMMER 2025, 3 Marks; WINTER 2025, 4 Marks)**

3. Impact of Man on Environment:

- **Q.** Give your view, How human being is impact on to the environment / Describe impact of man on environment / Explain cumulative impact of man on environment due to Urbanisation. / Discuss the impact of chemical industries on environment. **(SUMMER 2023, 3 Marks; WINTER 2024, 3 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 4 Marks OR)**

Other Important Questions:

1. Environment, Pollutants & Ecosystem:

- **Q.** Define: environment. What are the main categories of environment? **(SUMMER 2026, 3 Marks)**
- **Q.** What are pollutants? Give classification of Pollutants. **(SUMMER 2026, 4 Marks)**
- **Q.** List Various components of Ecosystem. **(WINTER 2024, 3 Marks)**

Chapter 2: Air pollution: classification/properties, behaviour/fate, meteorology, control equipment, gaseous emissions, stack sampling

Repeated Questions:

1. Classification, Properties, Behaviour & Meteorology of Air Pollutants:

- **Q.** Explain classification and properties of air pollutants / Discuss the classification and properties of air pollution. **(SUMMER 2022, 4 Marks; SUMMER 2023, 4 Marks; SUMMER 2025, 3 Marks)**
- **Q.** Describe behaviour and fate of air pollutants. **(SUMMER 2022, 4 Marks; WINTER 2025, 4 Marks)**
- **Q.** Define/Explain various concentration scales for gaseous pollutants. **(SUMMER 2022, 3 Marks; WINTER 2022, 3 Marks; WINTER 2025, 3 Marks)**

2. Air Pollution Control Equipment:

- **Q.** Explain with neat sketch the design steps of Gravity Settling chambers / Explain gravity settling chamber with neat sketch. / Explain with neat diagram of Gravity settling chamber and Cyclone separator. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks; SUMMER 2023, 3 Marks OR; SUMMER 2025, 7 Marks; WINTER 2025, 7 Marks)**
- **Q.** Explain cyclone separator with neat sketch. [Diagram required – refer to the original question paper] **(SUMMER 2023, 7 Marks; SUMMER 2025, 7 Marks - combined with gravity settling chamber)**
- **Q.** Enlist the equipment used for control of particulate air pollutant in industry. Explain construction and working of Electrostatic Precipitators (ESP) / With neat sketch explain electro static precipitators. Also discuss the advantages. [Diagram required – refer to the original question paper] **(SUMMER 2022, 7 Marks; SUMMER 2026, 7 Marks)**
- **Q.** State the types of wet scrubber for particulate removal. Discuss any one in brief with neat sketch. [Diagram required – refer to the original question paper] **(SUMMER 2022, 7 Marks; WINTER 2022, 7 Marks)**

Other Important Questions:

1. Effects of Air Pollution & Specific Pollutants:

- **Q.** Explain effects of air pollution on human health and materials. **(U3, 3 Marks)**
- **Q.** Short note: Effect of air pollution on agriculture and economy. **(SUMMER 2023, 7 Marks)**
- **Q.** What is photochemical smog? What are its effects? **(SUMMER 2026, 3 Marks)**
- **Q.** List the major air pollutant and explain sources and effect of carbon monoxide in detail. **(WINTER 2024, 7 Marks)**

2. Air Pollution Control Equipment:

- **Q.** Short note: Commonly used as air pollution control devices in industry and transportation. **(SUMMER 2023, 7 Marks OR)**
- **Q.** Illustrate wet precipitation for removal of air pollutants. **(SUMMER 2026, 4 Marks)**
- **Q.** Discuss the source correction methods with examples to prevent air pollution. **(SUMMER 2022, 7 Marks)**
- **Q.** Discuss various equipments used to separate the particulate matters from the effluent gases to avoid air pollution. **(U3, 7 Marks OR)**
- **Q.** Explain construction and working of venturi scrubber as particulate control equipment. **(WINTER 2024, 4 Marks)**

3. Classification, Properties, Behaviour & Meteorology of Air Pollutants:

- **Q.** What is air pollution meteorology? **(SUMMER 2025, 3 Marks OR)**

Chapter 3: Water pollution: sources/classification, characterization, standards, wastewater treatment, sedimentation and biological treatment

Repeated Questions:

1. Water Pollutants: Sources, Classification & Characterization:

- **Q.** Differentiate the term BOD and COD with its significance / Define terms: BOD and COD with its significance. **(U3, 3 Marks OR; SUMMER 2025, 3 Marks; WINTER 2025, 3 Marks)**
- **Q.** Explain sources and classification of water pollutants / Discuss sources and classification of water pollutants / Define: Water Pollution. Describe sources of water pollution. **(U3, 4 Marks OR; SUMMER 2022, 3 Marks; SUMMER 2023, 4 Marks OR; SUMMER 2025, 3 Marks; SUMMER 2026, 4 Marks)**
- **Q.** Write a note on physico-chemical characterization of waste water / List out physico-chemical characterization of wastewater. **(SUMMER 2022, 4 Marks; SUMMER 2023, 7 Marks OR)**

2. Water Quality Standards & Control of Water Pollution:

- **Q.** Write a short note on control of water pollution. **(U3, 4 Marks; WINTER 2022, 4 Marks)**

3. Wastewater Treatment Processes:

- **Q.** Explain pretreatment, primary and secondary waste water treatment processes / Describe primary, secondary and tertiary wastewater treatments / Explain wastewater treatment processes. / Explain the removal of dissolved inorganic solids by advanced waste water treatment processes. **(SUMMER 2022, 7 Marks; SUMMER 2023, 7 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 7 Marks - primary, secondary and tertiary; SUMMER 2026, 7 Marks OR)**
- **Q.** Design of sedimentation tanks and biological treatment processes. **(SUMMER 2023, 7 Marks)**

Other Important Questions:

1. Water Pollutants: Sources, Classification & Characterization:

- **Q.** Enlist sources of water pollutant with classification. **(WINTER 2025, 3 Marks)**

2. Water Quality Standards & Control of Water Pollution:

- **Q.** Explain water quality standard as per WHO. **(SUMMER 2025, 4 Marks)**
- **Q.** Write a short note on Indian Standards for Drinking Water. **(SUMMER 2026, 7 Marks)**

3. Wastewater Treatment Processes:

- **Q.** Explain process used for removal of suspended solids from waste water. **(SUMMER 2026, 3 Marks)**

Chapter 4: Solid waste management: sources/classification, public health, collection, disposal, recovery and recycling

Repeated Questions:

1. Sources, Classification & Public Health:

- **Q.** What are the sources of solid waste? Write its classification / Give classification of solid waste. **(SUMMER 2022, 3 Marks; WINTER 2022, 3 Marks; WINTER 2024, 3 Marks; SUMMER 2026, 3 Marks OR)**

2. Collection, Disposal, Landfill & Incineration:

- **Q.** Explain sanitary landfill operation / Discuss methods of land-filling / Discuss solid waste method like Sanitary land filling and Incineration. [Diagram required – refer to the original question paper] **(SUMMER 2022, 3 Marks; WINTER 2024, 4 Marks; SUMMER 2025, 7 Marks)**
- **Q.** Write short note on Incineration. **(SUMMER 2025, 7 Marks - combined with sanitary landfilling; SUMMER 2026, 4 Marks OR)**
- **Q.** Discuss methods of solid waste disposal / Discuss any one method for disposal of Solid wastes from Chemical Process Industry. **(U3, 3 Marks OR; SUMMER 2023, 7 Marks OR; WINTER 2024, 4 Marks; SUMMER 2025, 7 Marks; SUMMER 2026, 4 Marks OR)**

3. Recovery & Recycling:

- **Q.** Discuss the methods to recover and recycle solid waste like paper, glass and metals. **(SUMMER 2022, 7 Marks; WINTER 2025, 7 Marks)**

Other Important Questions:

1. Collection, Disposal, Landfill & Incineration:

- **Q.** What are the methods of solid waste collection? **(SUMMER 2023, 4 Marks)**
- **Q.** Explain management and disposal of hazardous waste. **(U3, 3 Marks)**

2. Sources, Classification & Public Health:

- **Q.** Write public health aspects due to solid waste. **(SUMMER 2025, 3 Marks)**

Chapter 5: MSDS, exposure control, fire and explosion, relief devices, safety instrumentation, hazard identification and hazard analysis techniques, DOW index

Repeated Questions:

1. MSDS, Chemical Exposure & Industrial Hygiene:

- **Q.** Explain Material Safety Data Sheet (MSDS) / What is MSDS? Explain its sections / What do you understand about MSDS? Explain. **(U3, 3 Marks; WINTER 2022, 3 Marks; SUMMER 2023, 4 Marks OR; SUMMER 2026, 3 Marks)**

2. Hazard Identification & Analysis (HAZOP, DOW Index, Fault Tree):

- **Q.** List the techniques used for hazard identification? Explain HAZOP method in detail / What are the objectives of HAZOP studies? Explain its guide words with meaning. **(U3, 7 Marks; SUMMER 2022, 4 Marks - short notes HAZOP; WINTER 2022, 7 Marks; SUMMER 2023, 4 Marks OR - short note HAZOP; WINTER 2024, 7 Marks; SUMMER 2025, 7 Marks; WINTER 2025, 7 Marks; SUMMER 2026, 7 Marks)**
- **Q.** Describe DOW index / What is DOW index? Give its importance in chemical industries / Explain its general outline. **(SUMMER 2022, 4 Marks; WINTER 2022, 3 Marks OR; SUMMER 2025, 4 Marks; WINTER 2025, 4 Marks; SUMMER 2026, 4 Marks)**
- **Q.** Define fault Tree and Event tree analysis / Explain Fault tree analysis method with meaning of all Symbols and GATES / Write a short note on Fault tree analysis. **(U3, 7 Marks; SUMMER 2022, 3 Marks; WINTER 2024, 7 Marks; WINTER 2025, 3 Marks)**

3. Pressure Relief Devices & Source Models:

- **Q.** Explain working principle and industrial applications of Rupture disc. **(U3, 4 Marks; WINTER 2022, 4 Marks OR; WINTER 2025, 4 Marks)**
- **Q.** State various pressure relief devices / safety release valve / pressure relief valve — construction and working with neat sketch. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 4 Marks OR; SUMMER 2026, 7 Marks OR)**

4. Fire & Explosion:

- **Q.** Explain fire triangle / Define fire triangle in detail / Explain fire triangle and list the types of fire. **(U3, 7 Marks OR - fire triangle and inserting as method of preventing fire; WINTER 2022, 3 Marks; SUMMER 2023, 4 Marks; WINTER 2024, 3 Marks)**
- **Q.** Explain in brief detonation and deflagration / Write a note on detonation and deflagration. **(SUMMER 2022, 3 Marks; WINTER 2022, 3 Marks OR; SUMMER 2025, 4 Marks; WINTER 2025, 3 Marks)**
- **Q.** Explain UVCE / Explain BLEVE / Differentiate UVCE and BLEVE. **(SUMMER 2022, 3 Marks - UVCE; SUMMER 2022, 3 Marks - BLEVE; WINTER 2022, 3 Marks - BLEVE; WINTER 2022, 3 Marks OR - UVCE; SUMMER 2025, 4 Marks - differentiate UVCE and BLEVE; WINTER 2025, 3 Marks - UVCE)**

5. Emergency Planning:

- **Q.** Discuss Off-site and On-site emergency planning with its importance. **(U3, 7 Marks; WINTER 2022, 7 Marks OR)**

Other Important Questions:

1. Hazard Identification & Analysis (HAZOP, DOW Index, Fault Tree):

- **Q.** What are various Hazard analysis techniques? Explain. **(SUMMER 2023, 4 Marks)**
- **Q.** What is hazard? Write a note on Hazard identification checklist procedure. **(SUMMER 2022, 7 Marks)**

2. MSDS, Chemical Exposure & Industrial Hygiene:

- **Q.** Discuss the various sources of chemical exposure. **(WINTER 2024, 4 Marks)**
- **Q.** Explain industrial hygiene. **(U3, 3 Marks)**

3. Fire & Explosion:

- **Q.** What is explosive? Write its types. **(WINTER 2024, 3 Marks)**
- **Q.** Discuss about the fire extinguishing agents used in fire extinguisher. **(SUMMER 2025, 7 Marks OR)**

4. Pressure Relief Devices & Source Models:

- **Q.** Explain source model of flow of liquids through pipes. **(U3, 4 Marks)**

Chapter 6: Environmental rules/regulations, EIA/EIS/EMP, pollution management, Factories Act, energy audit, environment audit

Repeated Questions:

1. Environmental & Energy Audit:

- **Q.** Write short note on environmental audit / Explain environmental audit / Explain concept of energy audit and environment audit / Explain methodology and benefits of Environment Audit in detail. **(U3, 4 Marks; WINTER 2022, 4 Marks; SUMMER 2023, 3 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 4 Marks OR; WINTER 2025, 4 Marks)**
- **Q.** What is Energy audit? Why is it important? / Define energy audit and environment audit / What is energy audit? Write its objectives. **(U3, 4 Marks; WINTER 2022, 4 Marks; SUMMER 2023, 3 Marks; SUMMER 2025, 4 Marks OR; SUMMER 2026, 3 Marks OR)**

2. Environmental Impact Assessment (EIA) & Statement (EIS):

- **Q.** State and explain the factors to be considered while doing Environment Impact Assessment (EIA). **(WINTER 2022, 4 Marks; WINTER 2025, 4 Marks)**
- **Q.** Give the objectives and benefits of Environment Impact Assessment (EIA). **(WINTER 2024, 4 Marks; SUMMER 2026, 3 Marks)**

3. Environmental Rules, Regulations & Pollution Management:

- **Q.** State the various rules, regulations, Laws regarding Environmental Protection, Prevention and Control / Explain rules and regulations for environmental protection and control. **(WINTER 2022, 7 Marks OR; WINTER 2024, 3 Marks)**
- **Q.** Discuss government role and voluntary organizations in controlling pollution. **(SUMMER 2023, 3 Marks)**
- **Q.** Explain importance of pollution control and safety management in chemical industry. **(SUMMER 2025, 7 Marks OR; WINTER 2025, 7 Marks)**

4. Factories Act & Labour Laws:

- **Q.** Enlist various health provisions mentioned in factories act, 1948 / Describe health provision as per industries factory act. **(U3, 4 Marks; WINTER 2024, 4 Marks; WINTER 2025)**
- **Q.** Define terms: payment and wages act / What is the aim of payment and wages act? Explain how it safeguards the interest of the workers. **(WINTER 2022, 4 Marks; SUMMER 2023, 3 Marks)**

Other Important Questions:

1. Factories Act & Labour Laws:

- **Q.** Describe features of factory act. **(U3, 3 Marks)**
- **Q.** Explain the following terms as per Industrial Dispute Act: a) Wages b) Industry c) Employer. **(U3, 7 Marks)**
- **Q.** Describe welfare provisions as per industries factory act. **(WINTER 2024, 4 Marks)**

2. Environmental Impact Assessment (EIA) & Statement (EIS):

- **Q.** Describe standards and legislation of EIA and EIS. **(SUMMER 2025, 7 Marks OR)**
- **Q.** Discuss the methodology for Environmental Impact Statement (EIS) and mention limitation of EIS. **(WINTER 2024, 7 Marks)**

Chapter 7: Safe industrial practices, safety movement, safety science, basic concepts of safety audit, safety permits and safety programmes

Repeated Questions:

1. Safety Audit:

- **Q.** What are the objectives/advantages/basic concepts of Safety Audit? Explain the procedure to carry out safety audit in any chemical unit. **(U3, 7 Marks OR; SUMMER 2023, 3 Marks OR; WINTER 2024, 3 Marks; SUMMER 2025, 4 Marks; SUMMER 2026, 3 Marks OR)**

2. Safe Practices, Safety Programmes & Basic Concepts:

- **Q.** Explain the importance/need of safety practices in industries/factory. **(WINTER 2024, 4 Marks; SUMMER 2026, 4 Marks OR)**

3. Safety Permits & Emergency Planning:

- **Q.** Discuss different types of Safety Permit. Discuss its content and validity. **(U3, 7 Marks; WINTER 2025, 7 Marks)**
- **Q.** Discuss Off-site and On-site emergency planning with its importance. **(U3, 7 Marks; WINTER 2022, 7 Marks OR)**

Other Important Questions:

1. Safe Practices, Safety Programmes & Basic Concepts:

- **Q.** Briefly explain the ingredients of successful safety program. **(WINTER 2025, 3 Marks)**
- **Q.** Define safety, risk and accident. **(U3, 3 Marks)**

Chapter 8: Cleaner Production, sustainable development, green chemistry, waste prevention/minimization

Repeated Questions:

1. Cleaner Production (CP):

- **Q.** Briefly explain various Cleaner production practices adopted by chemical industries / Explain various cleaner production practices adopted by Chemical Industries. **(SUMMER 2023, 7 Marks OR; SUMMER 2025, 7 Marks OR; WINTER 2025, 3 Marks)**
- **Q.** Explain six step methodology of CP. **(U3, 7 Marks; WINTER 2022, 7 Marks OR; WINTER 2025, 7 Marks)**
- **Q.** What are the Barriers and Drivers in cleaner production? **(SUMMER 2022, 4 Marks; WINTER 2022, 4 Marks OR)**

2. Green Chemistry & Sustainable Development:

- **Q.** Explain principles of green chemistry / Explain principle of green chemistry and atom economy. **(SUMMER 2022, 4 Marks; WINTER 2022, 4 Marks OR; SUMMER 2025, 3 Marks OR; WINTER 2025, 4 Marks)**

Other Important Questions:

1. Cleaner Production (CP):

- **Q.** Define Cleaner Production. **(U3, 3 Marks)**
- **Q.** Enlist the benefits of CP. **(U3, 4 Marks)**
- **Q.** Write the techniques for waste prevention and minimization in Cleaner Production. **(WINTER 2024, 7 Marks)**

2. Green Chemistry & Sustainable Development:

- **Q.** Define: Sustainable development. Write its principles. **(WINTER 2024, 3 Marks)**

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