

GUJARAT TECHNOLOGICAL UNIVERSITY

BE-6 SEMESTER – OLD PAPER – S22 TO W25 – QUESTION BANK

Subject Name & Code:

WASTE WATER ENGINEERING (3160513)

Unit 1: Characterization and treatment of wastewater

Repeated Questions:

1. Discuss wastewater characteristics. (S24 - Q.2(a), 04 marks) & (W23 - Q.3(a), 03 marks)
2. Explain the wastewater collection system. (S22 - Q.1(b), 03 marks) & (W25 - Q.1(b), 03 marks)
3. List out/Enlist the physical characteristics of the wastewater and state their environmental significance. (S23 - Q.1(c), 07 marks) & (W24 - Q.5(a), 03 marks)
4. Explain sampling protocol for wastewater treatment. (S24 - Q.1(a), 03 marks) & (S22 - Q.2(a), 03 marks)
5. Explain Coagulation and flocculation in wastewater treatment. (S23 - Q.2(a), 03 marks) & (W24 - Q.2(a), 03 marks)
6. Discuss the various types of Screens used for wastewater treatment. (S23 - Q.2(b), 04 marks) & (W24 - Q.3(b), 04 marks)
7. What is equalization? Explain the importance of the equalization process in a wastewater treatment plant. (S25 - Q.3(a), 03 marks) & (W22 - Q.5(b), 04 marks)
8. Explain the method and importance of neutralization used for wastewater treatment. (S23 - Q.5(a), 03 marks) & (W24 - Q.1(a), 03 marks)

Other Important Questions:

1. Define: (1) Equalization (2) Neutralization (3) Strength Reduction. (W24 - Q.1(a), 03 marks)
2. Explain the four stages of the wastewater treatment process. (W24 - Q.1(b), 04 marks)
3. List challenges involved in wastewater treatment? And explain one. (S22 - Q.1(a), 03 marks)
4. Why do we need to follow sampling protocols while sampling? (W25 - Q.3(a), 03 marks)
5. Discuss: Waste water. (S23 - Q.1(a), 03 marks)
6. Discuss the various sources of Waste water. (S23 - Q.1(b), 04 marks) & (S25 - Q.1(b), 04 marks)
7. Discuss steps involved in wastewater treatment. (S24 - Q.1(c), 07 marks)
8. Define: (1) Sedimentation (2) Plain Sedimentation (3) Coagulation. (W22 - Q.1(a), 03 marks)
9. Enlist various types of screens and describe coarse screens used in wastewater treatment? (W22 - Q.1(b), 04 marks)
10. Write down the name of the processes used for industrial wastewaters treatment? (W22 - Page2 Q.3(a), 03 marks)
11. What are the various factors affecting industrial wastewater sedimentation? (W22 - Page2 Q.3(b), 04 marks)
12. State and discuss the major issues associated with industrial wastewater. (W24 - Q.1(c), 07 marks)
13. Discuss volume and strength reduction of wastewater. (S23 - Q.3(b), 04 marks)
14. Discuss the need for the proportioning process. (W25 - Q.3(a), 03 marks)
15. Explain proportioning processes. (W23 - Q.5(b), 04 marks)
16. List all physical treatments involved in physicochemical treatment. (W23 - Q.3(a), 03 marks)
17. List out the unit operations involved in physicochemical treatment. (S25 - Q.2(a), 03 marks)
18. Explain the importance of equalization for industrial wastewater? (W22 - Q.5(b), 04 marks)
19. How does treatment cost have a direct relation with the quantification of wastewater flows? (W25 - Q.2(a), 03 marks)

20. What is Aeration? What are the objectives of providing aeration in water treatment? (W22 - Q.2(a), 03 marks)
21. Discuss in brief various types of settling processes and outline design considerations of sedimentation tanks. (W22 - Q.1(c), 07 marks)
22. Discuss the various stages of wastewater treatment methods in brief. (S23 - Q.2(c), 07 marks)
23. Explain preliminary and primary treatment processes. Differentiate between them. (W25 - Q.5(b), 04 marks)
24. Differentiate between preliminary and primary treatment process. (W25 - Q.5(b), 04 marks)
25. Discuss the reasons for collecting data through sampling. What standards should apply while obtaining data by sampling? (S23 - Q.2(c) OR, 07 marks)
26. Discuss wastewater generation points in oil refineries. (S23 - Q.3(a), 03 marks)
27. Draw process flow sheet of textile industry and list the points of generation of wastewater. (W24 - Q.3(a), 03 marks)
28. List the wastewater generation points and discuss them in brief. (W24 - Q.5(b) OR, 04 marks)

Unit 2: Activated sludge treatment for wastewater

Repeated Questions:

1. Explain ASP in treating wastewater with neat labeled flow diagram. Discuss the various design parameters involved in it. (W22 - Q.2(c), 07 marks) & (S25 - Q.1(c), 07 marks)
2. Explain Activated Sludge Process with a neat diagram. (W24 - Q.2(b), 04 marks) & (S22 - Q.2(c), 07 marks)
3. Develop mass balance for activated sludge process. (S22 - Q.2(b), 04 marks) & (W25 - Q.5(c), 07 marks)
4. Discuss activated sludge with its mass balance. (W25 - Q.5(c), 07 marks)
5. Explain theory for activated sludge process (ASP). (S24 - Q.2(c), 07 marks)
6. Differentiate between Activated sludge unit and Trickling filter. (W22 - Q.2(b), 04 marks) & (W24 - Q.2(c) OR, 07 marks)
7. Explain a Sequential Batch Reactor. (W24 - Q.3(b) OR, 04 marks) & (S24 - Q.2(b), 04 marks)
8. Explain in detail sequential batch reactor. (W25 - Q.2(c) OR, 07 marks) & (W23 - Q.5(c), 07 marks)
9. Discuss the working principle of oxidation ditch with advantages and disadvantages using a typical process flow diagram. (S23 - Q.3(c), 07 marks) & (W22 - Q.2(c) OR, 07 marks)
10. Explain aerated lagoons. (S24 - Q.1(b), 04 marks) & (W24 - Q.3(a) OR, 03 marks)
11. Explain duckweed pond. (W25 - Q.4(b), 04 marks) & (S24 - Q.5(b) OR, 04 marks)
12. Explain the attached growth process with trickling filters. (S22 - Q.2(c) OR, 07 marks) & (S25 - Q.4(b), 04 marks)

Other Important Questions:

1. What are oxidation ditches? (S24 - Q.2(a), 03 marks)
2. Explain rotating biological contactor. (W25 - Q.2(c), 07 marks)
3. Explain in detail rotating biological contractor. (W25 - Q.2(c), 07 marks)
4. Explain Rotating Biological Contactor (RBC) with a neat diagram and detailed description of its construction and working. (W24 - Q.3(c) OR, 07 marks)
5. Explain a rotating biological contactor for aerobic wastewater treatment. (W23 - Q.5(c) OR, 07 marks)
6. Explain extended aeration wastewater treatment method. (W23 - Q.3(b), 03 marks)
7. Explain mass balance and design for trickling filter (TF). (S24 - Q.2(c) OR, 07 marks)
8. Differentiate between high rate trickling filters and low rate trickling filters. (S25 - Q.3(b) OR, 04 marks)
9. Mention design steps for Activated Sludge Process. (S23 - Q.4(b) OR, 04 marks)
10. Give the design steps for trickling filters. (S25 - Q.4(a) OR, 03 marks)
11. Outline steps which involved in trickling filters. (W25 - Q.1(b), 04 marks)
12. Explain the process steps of trickling filters. (W23 - Q.4(b), 04 marks)
13. Explain stabilizing ponds for aerobic wastewater treatment. (W23 - Q.4(b), 04 marks)
14. Discuss the significance of stabilization ponds. (W24 - Q.5(b) OR, 04 marks)
15. Differentiate between aerated lagoons and activated sludge treatment process. (W23 - Q.2(b), 04 marks)
16. Select and explain any primary treatment process for wastewater treatment. (W23 - Q.1(b), 04 marks)
17. Describe physic- chemical and biological treatment strategies. (W25 - Q.5(c), 07 marks)

Unit 3: Anaerobic treatment of wastewater

Repeated Questions:

1. Explain Upflow Anaerobic Sludge Blanket (UASB) reactor for wastewater treatment. (S23 - Q.3(c) OR, 07 marks) & (S24 - Q.4(c) OR, 07 marks) & (W24 - Q.3(c), 07 marks)
2. Explain up-flow anaerobic sludge blanket (UASB) reactor. (S22 - Q.3(b), 04 marks)
3. State the advantages of UASB reactor. (W22 - Q.3(b), 04 marks)
4. List all parameters which can affect the anaerobic wastewater treatment process. (W23 - Q.2(a), 03 marks) & (S25 - Q.3(b) OR, 04 marks)
5. Explain in detail factors affecting anaerobic processes. (W22 - Q.3(c) OR, 07 marks)
6. Explain the effect of pH and temperature on anaerobic wastewater treatment. (W24 - Q.5(a) OR, 03 marks)
7. Why pH adjustment is necessary for the anaerobic process? (W25 - Q.5(a), 03 marks)
8. How temperature can affect the anaerobic process efficiency? (W25 - Q.5(a), 03 marks)
9. Interpret the importance of pH in the anaerobic treatment process. (S22 - Q.3(a), 03 marks)
10. Discuss the importance of temperature in the anaerobic treatment process. (S22 - Q.3(a) OR, 03 marks)
11. Discuss effect of various parameters on anaerobic treatment? (S24 - Q.3(a), 03 marks)
12. Explain the concept of anaerobic contact process. (W25 - Q.3(c) OR, 04 marks) & (S24 - Q.3(b), 04 marks)
13. Demonstrate concept of anaerobic contact process with fixed film reactor. (W25 - Q.3(c), 07 marks)
14. Explain fixed film reactor in Anaerobic treatment of wastewater. (S24 - Q.3(c), 07 marks)
15. Describe working of anaerobic fixed film reactor. (S23 - Q.3(b) OR, 04 marks)
16. Explain expanded bed reactors for anaerobic wastewater treatment. (W23 - Q.3(c), 04 marks) & (S22 - Q.4(b), 04 marks)
17. Differentiate fluidized bed and expanded bed reactor with UASB. (W25 - Q.3(c), 07 marks)

Other Important Questions:

1. What are the essential conditions for efficient anaerobic treatment? (W22 - Q.3(a), 03 marks)
2. List out conditions for efficient anaerobic treatment. (S24 - Q.3(a) OR, 03 marks)
3. Explain the principle of the anaerobic treatment process. (W23 - Q.5(a) OR, 03 marks)
4. List anaerobic treatment technologies. (W23 - Q.5(a), 03 marks)
5. Classify different types of anaerobic reactors. Explain in detail Static granular bed reactor (SGBR). (W22 - Q.3(c), 07 marks) & (S25 - Q.3(c), 07 marks)
6. Explain static granular bed reactor. (S24 - Q.3(b) OR, 04 marks)
7. List the various advantages of anaerobic processes. (W22 - Q.3(a) OR, 03 marks)
8. Write the various advantages and disadvantages of anaerobic processes. (S25 - Q.5(b) OR, 04 marks)
9. Compare the anaerobic and aerobic processes. (W22 - Q.3(b) OR, 04 marks)
10. Explain the difference between aerobic and anaerobic wastewater treatment processes. (W24 - Q.4(a), 03 marks)
11. Explain the anaerobic filter system used for wastewater treatment. (S22 - Q.4(b) OR, 04 marks)
12. Explain Anaerobic Filters and Oxidation ditches with neat diagrams of each. (W24 - Q.2(c), 07 marks)
13. State the difference between anaerobic fixed film reactor and anaerobic fluidized bed reactor. (W24 - Q.4(a) OR, 03 marks)

Unit 4: Planning for wastewater treatment and its reclamation

Repeated Questions:

1. Discuss Indian standards for disposal of treated wastewaters on land and in natural streams. (S23 - Q.5(b) OR, 04 marks) & (S24 - Q.4(a), 03 marks) & (S25 - Q.4(b) OR, 04 marks) & (W24 - Q.4(c) OR, 03 marks)
2. Write Indian standards for disposal of effluent water in the environment. (S22 - Q.5(a), 03 marks)
3. Explain reuse and reclamation of wastewater. (W25 - Q.4(b), 04 marks)
4. Discuss wastewater reclamation and reuse in detail. (S23 - Q.4(c) OR, 07 marks)
5. Why do we need to reuse treated wastewater? (S22 - Q.4(a), 03 marks)
6. Justify importance of waste water reuse. (S24 - Q.4(a) OR, 03 marks)
7. Why reclaimed wastewater can be safe for agricultural irrigation? (W22 - Q.4(a) OR, 03 marks) & (S25 - Q.5(a) OR, 03 marks)
8. Why agriculture irrigation of reclaimed waste water is important? (S24 - Q.5(a) OR, 03 marks)
9. Explain the importance of ground water recharge of reclaimed waste water. (S24 - Q.4(b) OR, 04 marks)
10. Can reclaimed wastewater be useful for underground water recharge? Explain the reason for the same. (W24 - Q.4(b), 04 marks)
11. Explain why the groundwater recharge system is needed for the survival of human activities. (W25 - Q.3(b), 04 marks)
12. Explain the ground water recharge system. (S22 - Q.4(a) OR, 03 marks)
13. Explain duckweed pond. (W25 - Q.4(b), 04 marks) & (S24 - Q.5(b) OR, 04 marks) & (W22 - Q.4(a), 03 marks)
14. Explain in detail Duckweed pond and vermiculture technology for wastewater treatment. (S25 - Q.5(c), 07 marks)
15. Explain Vermiculture technology for waste water treatment. (S23 - Q.4(b), 04 marks)
16. What is vermiculture technology for wastewater treatment? (S22 - Page2 Q.5(a), 03 marks)
17. Explain vermiculture and root zone wastewater treatment process. (W23 - Q.1(c), 07 marks)
18. How does the root zone technology work to treat the wastewater? (W25 - Q.1(a), 03 marks)
19. Write about Root zone technology for waste water treatment. (S23 - Q.4(a), 03 marks) & (S24 - Q.4(b), 04 marks)
20. Define following term for waste water treatment: Duckweed pond, (ii) vermiculture and (iii) root zone technology. (W22 - Q.4(a), 03 marks)
21. List recent technologies used for treatment. (W25 - Q.4(a), 03 marks)
22. List recent advanced technologies in wastewater treatment. Explain detail to any one. (S22 - Q.3(c), 07 marks)
23. Discuss recent advancement in technologies for waste water treatment. (S24 - Q.4(c) OR, 07 marks)

Other Important Questions:

1. Why disposal standardization is required to regulate the disposal of treated wastewater? (W25 - Q.4(a), 03 marks)
2. Describe advantages and disadvantages with respect to wastewater reuse. (W22 - Q.4(b) OR, 04 marks)
3. Interpret and explain the term "reuse and reclamation of treated wastewater". (W23 - Q.4(c), 07 marks)
4. Enlist the various different applications of treated wastewater. (W22 - Q.4(c), 07 marks)
5. State the methodologies for wastewater reclamation and explain any two in brief. (W24 - Q.4(b) OR, 04 marks)
6. Explain in detail the duckweed pond technology for wastewater treatment. (W22 - Q.4(c) OR, 07 marks)
7. Describe the following technologies in detail: 1. Duckweed Pond 2. Vermiculture 3. Root Zone technology. (W24 - Q.4(c), 07 marks)

8. Give detail classification of biological treatment processes and their uses for waste water treatment. (S23 - Q.4(c), 07 marks)
9. What are special treatments available for waste water treatment. (S24 - Q.5(b), 04 marks)
10. Use recent technologies to explain in detail the need for wastewater treatment. (W23 - Q.4(c), 07 marks)
11. Which are the challenges faced to treat wastewater treatment? (W23 - Q.4(a) OR, 03 marks) & (S25 - Q.4(a), 03 marks)

Unit 5: Industrial wastewater treatment

Repeated Questions:

1. Develop and discuss wastewater treatment plants for the paper and pulp industry. (W25 - Q.4(c), 07 marks) & (S22 - Q.5(c), 07 marks)
2. Which types of impurities can be intricate in waste water from pulp and paper industry? (S23 - Q.4(a) OR, 03 marks)
3. Develop and discuss wastewater treatment plants for the textile industry. (W25 - Q.4(c), 07 marks) & (S25 - Q.2(c), 07 marks)
4. Describe the waste water treatment process in Textile industry with neat flow diagram. (S25 - Q.2(c) OR, 07 marks) & (S23 - Q.5(c) OR, 07 marks)
5. Discuss the treatment methodology for dyes industry wastewater. (S24 - Q.4(c), 07 marks) & (W24 - Q.5(c), 07 marks)
6. Develop and discuss wastewater treatment plants for reactive dyes industry wastewater. (W25 - Q.1(c), 07 marks)
7. Explain the wastewater treatment process for dye and intermediate industries. (S22 - Page2 Q.5(c), 07 marks)
8. Discuss recent technologies used for color removal of Dye industry waste water. (S23 - Q.5(b), 04 marks)
9. Demonstrate and explain the wastewater treatment scheme for the dyes industries. (W23 - Q.3(c), 07 marks)
10. Discuss the treatment methodology for sugar industry wastewater. (S22 - Q.4(c), 07 marks) & (W24 - Q.5(c) OR, 07 marks)
11. Explain wastewater treatment scheme for sugar industries effluent. (W22 - Q.5(c), 07 marks)
12. Sketch the wastewater treatment flow diagram for the sugar industry. (W23 - Q.1(a), 03 marks)
13. Design a process flow sheet of wastewater treatment for steel industries. (W23 - Q.2(c), 07 marks) & (S25 - Q.2(c) OR, 07 marks)
14. Discuss the treatment methodology for steel industry wastewater. (S24 - Q.5(c), 07 marks)
15. Discuss the treatment methodology for oil refinery industry wastewater. (S24 - Q.5(c) OR, 07 marks)
16. Explain the wastewater treatment process for pharmaceutical industries. (S22 - Q.4(c) OR, 07 marks)

Other Important Questions:

1. Enlist various sources of industrial waste water. (W22 - Q.5(a), 03 marks)
2. Describe waste water treatment scheme for textile industries effluent? (W22 - Page2 Q.3(c), 07 marks)
3. Demonstrate and explain wastewater treatment flow diagram for the pulp and paper industry. (W23 - Q.3(d), 07 marks)
4. Why is it necessary to understand a process flow sheet for an efficient wastewater treatment process? (S22 - Q.5(b), 04 marks)
5. Interpret: how advanced treatment methods can contribute to improving wastewater treatment costs? (W25 - Q.3(b), 04 marks)
6. What are the challenges faced to treat wastewater? (W23 - Q.4(a) OR, 03 marks) & (S25 - Q.4(a), 03 marks)
