GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Name & Code:

ENVIRONMENTAL ENGINEERING (3160611)

Unit 1: Water Supply scheme/System

Repeated Questions:

1. **Differentiate between BOD and COD.** (W25 - Q3a, 03; W24 - Q3a, 03; S23 - Q3a, 03; S22 - Q3a, 03) *[Also appears in Unit 2, but primary classification is under Water Quality]*
2. **What is an intake structure? Sketch and explain construction and working of a river intake.** (S22 - Q2 OR(c), 07; S24 - Q2 OR(c), 07; W22 - Q2 OR(c), 07)
3. **Give comparison between rapid sand filter and slow sand filter.** (S22 - Q3(c), 07; S24 - Q3 OR(c), 07; W22 - Q3 OR(c), 07)
4. **Explain different chemical characteristics of water and discuss their environmental significance. / Enlist different chemical characteristics of water...** (S22 - Q1(c), 07; S24 - Q2(b), 04)
5. **Draw a neat flow chart of a Domestic Wastewater Treatment Plant. Enlist the function of each unit.** (S24 - Q1(c), 07; W22 - Q1(c), 07)

Other Important Questions:

1. **Design an intake well for handling 0.25 m³/sec of water.** (S25 - Q1(a), 03)
2. **Explain different types of water demand which has to be considered for the design of a water supply scheme for a city.** (S25 - Q1(c), 07)
3. **Differentiate between plain sedimentation and sedimentation aided with coagulation.** (S25 - Q2(a), 03)
4. **Explain different types of networks used for water distribution.** (S25 - Q2(c), 07)
5. **OR (c) Design a PST for handling 8 MLD of water.** (S25 - Q2 OR(c), 07)
6. **Give sanitary significance of: Nitrate, Iron and fluoride with reference to drinking water.** (S25 - Q3(a), 03)
7. **Enlist components of water supply scheme.** (W24 - Q1(a), 03)
8. **Define seasonal fluctuation and design period in water supply scheme.** (W24 - Q1(b), 04)
9. **Define Intake structure, enlist type of intake structure and explain any one in detail.** (W24 - Q1(c), 07)
10. **What is turbidity and enlist various methods to determine turbidity.** (W24 - Q2(a), 03)
11. **Draw layout of water treatment plant and briefly explain the different treatment unit.** (W24 - Q2(c), 07)
12. **OR (c) What is aeration, enlist different type of aeration, explain any one in detail.** (W24 - Q2 OR(c), 07)
13. **Enlist different unit processes and units operations used for wastewater treatment.** (S23 - Q1(a), 03)
14. **Design an intake well for handling 0.18 m³/sec of water.** (S23 - Q1(b), 04)
15. **Explain following chemical characteristics of water in detail: 1. Hardness 2. Alkalinity 3. Solids.** (S23 - Q1(c), 07)
16. **Define Intake. Enlist different types of intakes used in the water supply scheme.** (S23 - Q2(a), 03)
17. **Find the area of the rapid sand filter as well as number of beds required for treating 11 MLD of water. Also find the size of each filter bed.** (S23 - Q2(b), 04)
18. **What is coagulation? When it is required? Explain how to find the optimum dose of the coagulant required for water treatment.** (S23 - Q2(c), 07)

19. **OR (c) Why and when back washing is required in rapid sand filter? Draw a neat cross section of a bed of rapid sand filter.** (S23 - Q2 OR(c), 07)
20. **State the advantages and disadvantages of grid iron system used for distribution of the water.** (S23 - Q3 OR(a), 03)
21. **Compute pH and pOH values of freshly distilled water at 21°C.** (S24 - Q1(a), 03)
22. **Which are the sources of water? Mention the factors affecting selection of water source.** (S24 - Q1(b), 04)
23. **What is necessity of using coagulants in sedimentation? Explain the principle of coagulation.** (S24 - Q2(a), 03)
24. **What are the different types of pipes used for water supply? Discuss Asbestos cement (A.C.) pipes and Steel pipes in detail.** (S24 - Q2(c), 07)
25. **Differentiate between temporary hardness and permanent hardness.** (S24 - Q3(a), 03; W22 - Q3(a), 03)
26. **Make a list of various forms of chlorination and explain break point chlorination with graph.** (S24 - Q3(b), 04)
27. **Find out how much acidic is sample pH 3.0 compared to pH 6.0.** (W22 - Q1(a), 03)
28. **What do you understand by sedimentation with coagulation?** (W22 - Q2(a), 03)
29. **Enlist different chemical characteristics of water and discuss about acidity with their environmental significance.** (W22 - Q2(b), 04)
30. **What are the different types of pipes used for water supply? Discuss cast iron pipes and concrete pipes in detail.** (W22 - Q2(c), 07)
31. **Explain break point chlorination.** (W22 - Q3(b), 04)
32. **What are the requirements of good distribution system?** (W23 - Q1(a), 03)
33. **What control measures should be taken to prevent the outbreak of waterborne diseases?** (W23 - Q1(b), 04)
34. **Explain different factors affecting the water demand.** (W23 - Q1(c), 07)
35. **The pH of influent and effluent of an Industry is 5.3 and 8.4 respectively. Find average pH of waste water.** (W23 - Q2(a), 03)
36. **Write site selection criteria for an intake structure.** (W23 - Q2(b), 04)
37. **Make a list of various forms of chlorination and explain breakpoint chlorination.** (W23 - Q2(c), 07)
38. **Give the classification of different sources of water.** (W25 - Q1(a), 03)
39. **Give the sanitary significance of color and turbidity in water.** (W25 - Q1(b), 04)
40. **Explain how can you come to a final quantity of water required to be supplied to a town or city?** (W25 - Q1(c), 07)
41. **Explain in brief Arithmetic increase method of population forecasting.** (W25 - Q2(a), 03)
42. **What are intake towers? Differentiate between 'dry' and 'wet' intake towers.** (W25 - Q2(b), 04)
43. **Give IS standards for drinking water in India.** (W25 - Q2(c), 07)
44. **OR (c) Write a short note on "Rapid sand filter."** (W25 - Q2 OR(c), 07)
45. **What is the necessity of water supply scheme? Draw a complete flow diagram of water treatment plant.** (S22 - Q1(a), 03)
46. **Discuss various control measures for water borne diseases.** (S22 - Q1(b), 04)
47. **Explain population forecasting by geometrical increase method.** (S22 - Q2(a), 03)
48. **Find average of pH 2 and pH 6. Calculate how much acidic is pH 2 compared to pH 6.** (S22 - Q2(b), 04)
49. **What causes alkalinity in water.** (S22 - Q3(a), 03)
50. **Give advantages and disadvantages of RCC pipe.** (S22 - Q3(b), 04)
51. **Explain reflux valve with neat sketch.** (S22 - Q3 OR(a), 03)
52. **Write short note on Grid iron system of water distribution network.** (S22 - Q3 OR(b), 04)
53. **Design a sedimentation tank for a water works, which supplies 1.4×10^6 liter/day water to the town. The sedimentation period is 5 hours, the velocity of flow is 12 cm/minute, depth of water in the tank is 4.0 cm. Assuming an allowance for sludge is to be made as 80 cm.** (S22 - Q3 OR(c), 07) *[Numerical Question]*

Unit 2: Sewage : Characteristics, Treatment and Disposal

Repeated Questions:

1. **Explain aerobic decomposition and anaerobic decomposition of sewage.** (S24 - Q3 OR(a), 03; W22 - Q3 OR(a), 03)
2. **Sketch and explain construction and working of trickling filter.** (W24 - Q3 OR(c), 07; S24 - Q3(c), 07; W22 - Q3(b), 04 & Q4(b), 04)
3. **Describe activated sludge process with sketch.** (S24 - Q4(b), 04; W22 - Q4(b), 04)
4. **Explain the oxygen sag curve with diagram/sketch.** (W24 - Q3(b), 04; S23 - Q3 OR(b), 04; S24 - Q3 OR(b), 04)
5. **Give comparison between slow sand filter and rapid sand filter.** (S24 - Q3 OR(c), 07; W22 - Q3 OR(c), 07) *[Also in Unit 1, but classification based on context]*

Other Important Questions:

1. **Differentiate between suspended growth and attached growth biological treatment process.** (S25 - Q1(b), 04)
2. **Enlist different chemical characteristics of wastewater and explain any five of them in detail.** (S25 - Q3(c), 07)
3. **Define COD, BOD and TOC.** (S25 - Q3 OR(a), 03)
4. **Find the area required for a rapid sand filter for a city with the population of 60000 with an average rate of demand of 180 lpcd. Also find the number of beds required.** (S25 - Q3 OR(b), 04) *[Numerical Question]*
5. **Explain the working of rapid sand filter with a neat sketch. Also highlight the importance of backwashing for efficient working of the filter.** (S25 - Q3 OR(c), 07)
6. **If 4 day BOD of a sample at 30°C is 250 mg/lit, find its 5 day BOD at 35°C.** (S25 - Q4(a), 03) *[Numerical Question]*
7. **Explain the factors affecting self-purification capacity of a river.** (S25 - Q4(c), 07)
8. **Explain sewage sickness.** (W24 - Q3 OR(a), 03)
9. **Write short note on screening in waste water treatment.** (W24 - Q3 OR(b), 04)
10. **What is a trickling filter? Explain its working principle, components, and applications in wastewater treatment.** (W24 - Q3 OR(c), 07)
11. **Explain the process of sludge digestion and discuss the factors that affect its efficiency in wastewater treatment.** (W24 - Q3(c), 07)
12. **Draw a layout of a typical sewage treatment plant having an activated sludge unit as secondary treatment unit.** (S23 - Q3(b), 04) *[Diagram given - refer Question paper of S23]*
13. **Design a flash mixer for a design flow of 240 m^3/hr.** (S23 - Q3(c), 07) *[Numerical Question]*
14. **Design a Plain sedimentation tank for treating 7 MLD of water.** (S23 - Q3 OR(c), 07) *[Numerical Question]*
15. **A single stage trickling filter is required to treat 5 MLD of sewage having BOD of 200 mg/lit. Take Organic loading rate = 11000 kg/ha-m/day and recirculation ratio = 1. Find the effluent BOD of the filter. Assume BOD removal by PST = 30%.** (S23 - Q4(c), 07) *[Numerical Question]*
16. **Design a septic tank for a colony of 140 persons. Assume rate of water supply as 135 lpc.** (S23 - Q5(b), 04) *[Numerical Question]*
17. **If 4 day BOD of a sample at 25°C is 200 mg/lit, find its 5 day BOD at 35°C.** (S23 - Q5 OR(a), 03) *[Numerical Question]*
18. **What do you mean by self-purification? Explain with the sketch the oxygen sag curve.** (S24 - Q3 OR(b), 04)
19. **Explain 1st stage BOD and derive its formula with usual notations $L_4 = L_0[1 - (10)^{-Kd}]$.** (S24 - Q4(c), 07; W22 - Q4(c), 07)
20. **Explain design procedure of septic tank.** (S24 - Q3(b), 04; W22 - Q5(b), 04)
21. **Differentiate between aerobic and anaerobic decomposition of wastewater.** (W22 - Q3

OR(a), 03)

22. **What are various methods of disinfection? What are the chemicals used as disinfectants?** (W22 - Q4(c), 07)
23. **Write a short note on composting.** (W22 - Q5(a), 03)
24. **Discuss different methods of sewage disposal.** (W22 - Q5(c), 07)
25. **Explain in brief Aerobic and Anaerobic process.** (W25 - Q3 OR(a), 03)
26. **Write a brief note on various physical properties of waste water.** (W25 - Q3 OR(b), 04)
27. **Write a short note on "Activated sludge process."** (W25 - Q3 OR(c), 07)
28. **Define the following terms: (1) Relative stability. (2) population equivalent.** (W25 - Q3(b), 04)
29. **Draw a complete flow diagram of wastewater treatment plant and describe the function of each unit.** (W25 - Q3(c), 07; W23 - Q2 OR(c), 07)
30. **What is solid waste management? State the composition and characteristics of the municipal solid waste.** (S22 - Q2(c), 07)
31. **Differentiate between aerobic and anaerobic decomposition of wastewater.** (S22 - Q4(a), 03)
32. **What do you understand by sedimentation with coagulation?** (S22 - Q4(b), 04)
33. **Determine BOD_5 at 15°C if BOD_5 at 20°C is 150 mg/l. $kD_{(20)}$ = 0.23.** (S22 - Q4 OR(c), 07) *[Numerical Question]*
34. **Write a short note on septic tank.** (S22 - Q3(b), 04)
35. **Explain DO sag curve with sketch.** (S22 - Q3(c), 07)
36. **Explain effects of air pollution on human health.** (S22 - Q3 OR(a), 03)
37. **Sketch and explain construction and working of trickling filter.** (S22 - Q3 OR(c), 07)
38. **Enlist different biological processes. Differentiate suspended growth process and attached growth process.** (W23 - Q3(b), 04)
39. **Design a bar screen for a peak average flow of 65 million liters per day.** (W23 - Q3(c), 07) *[Numerical Question]*
40. **Differentiate between Rapid sand filter and Slow sand filter.** (W23 - Q4(c), 07)
41. **If the 5 day BOD at 20°C temperature of a waste water sample is found to be 180 mg/lit, find 3 day BOD at 30°C temperature of the sample. Assume K_D(20) = 0.1 /day.** (W23 - Q2 OR(b), 07) *[Numerical Question]*
42. **Explain in brief" Sewage sickness".** (W23 - Q3(a), 03)

Unit 3: Collection of sewage

Repeated Questions:
No verbatim repeats found across the provided papers for core Unit 3 topics (sewer types, design, appurtenances).
Other Important Questions:

1. **Find the most economical diameter of rising main to carry a discharge of 0.15 m^3/sec.** (S25 - Q4 OR(a), 03) *[Numerical Question]*
2. **Calculate the diameter and discharge of a circular sewer laid at a slope of 1 in 350 when it is running half full, and with a velocity of 1.1 m/s. Take Manning's N = 0.013.** (S25 - Q4 OR(b), 04) *[Numerical Question]*
3. **Differentiate between one pipe system and two pipe system.** (W24 - Q4(b), 04)
4. **Define sewer and explain different type of sewer.** (W24 - Q4(c), 07)
5. **Define sewage and sulfate.** (W24 - Q4 OR(a), 03)
6. **Write short note on Intercepting trap and catch basin.** (W24 - Q4 OR(b), 04)
7. **Explain methods of collection of sewage with their merits and demits.** (W24 - Q4 OR(c), 07)
8. **A combined sewer is to be designed to serve an area of 15 km^2 with a population density of 300 person/hectare. The average rate of sewage flow is 320 lpcd. The maximum flow is 60% in excess of average together with the rainfall equivalent of 14 mm in 24 hour, all of which appears as runoff. Determine the size of the circular sewer required. Assume maximum velocity of flow as 2.0 m/s.** (S23 - Q4(c), 07) *[Numerical Question]*
9. **Enumerate different shapes of sewers and describe circular sewer section.** (S24 - Q4(b), 04)
10. **Why circular sewers are more preferred for the sewerage system?** (W23 - Q4 OR(a), 03)
11. **State the requirements of good sewer joint. Enlist common types of joints used in sewer.** (W23 - Q4(b), 04)
12. **Explain different system of plumbing with neat sketch.** (W23 - Q4 OR(c), 07)

Unit 4: House Drainage

Repeated Questions:

1. **Explain different types of traps used in the house drainage system.** (S25 - Q5(b), 04; S23 - Q4(b), 04)
2. **State the principles of house drainage system.** (W25 - Q4(b), 04; S23 - Q5 OR(b), 04)

Other Important Questions:

1. **Differentiate between shallow and deep man hole.** (S25 - Q5(a), 03)
2. **Enlist different types of sewer appurtenances and explain any one in detail.** (S25 - Q5 OR(a), 03)
3. **Explain in brief Nahni trap.** (W25 - Q4(a), 03)
4. **Define the following terms. (1) Sullage (2) Rubbish (3) Soil pipe.** (W25 - Q4 OR(a), 03; W23 - Q4(a), 03)
5. **Write a short not on "one pipe plumbing system".** (W25 - Q4 OR(c), 07)
6. **Define soil pipe and vent pipe.** (W24 - Q4(a), 03)
7. **Define (1) Vent pipe (2) Rain water pipe (3) anti-siphone pipe.** (S24 - Q4(a), 03)
8. **Draw a house drainage plan for a 3BHK detached bungalow.** (W22 - Q4 OR(a), 03) *[Diagram expected]*
9. **Classify the traps according to shape and describe with sketch the same.** (W23 - Q4 OR(b), 04)

Unit 5: Solid Waste Management

Repeated Questions:

1. **What is solid waste management? Enlist its objectives. / What is solid waste management?** (W23 - Q5(a), 03; S22 - Q2(c), 07)
2. **Give classification of solid waste. / Give classification of Municipal Solid Waste.** (W25 - Q5(b), 04; S24 - Q3(a), 03)
3. **Write a short note on "Sanitary land filling". / What is sanitary land filling? Describe the different factors to be considered for the site selection of sanitary land filling.** (W23 - Q5(c), 07; S24 - Q3 OR(c), 07; W22 - Q5 OR(c), 07)
4. **Explain different types of landfilling techniques used for disposal of solid waste.** (S25 - Q4 OR(c), 07) *[Similar to above]*

Other Important Questions:

1. **Explain different measures for control of noise pollution.** (S25 - Q5(c), 07)
2. **Explain the role of EIA in achieving the goal of sustainable development.** (S25 - Q4(b), 04)
3. **Write short note on EIA.** (W24 - Q5(a), 03)
4. **Define Bio medical waste and enlist the sources of Biomedical waste.** (W24 - Q5(b), 04)
5. **Enlist different methods of solid waste disposal and explain any one in detail.** (W24 - Q5(c), 07)
6. **Define: 1. Garbage 2. Rubbish 3. Leachate.** (S23 - Q4(a), 03)
7. **Draw the flow chart showing all the functional elements of solid waste management system.** (S23 - Q4(a), 03) *[Diagram expected]*
8. **Define: Garbage, Rubbish and Sewage.** (S24 - Q4(a), 03; W22 - Q4(a), 03)
9. **Write a short note on composting.** (W22 - Q5(a), 03)
10. **Explain in brief "curb service "as a method of solid waste collection.** (W25 - Q5 OR(a), 03)
11. **Write a short note on Environment (protection) Act.** (W25 - Q5 OR(c), 07)
12. **What are the objectives of Environmental protection Act, 1986. Explain power of central government.** (S24 - Q3(c), 07)

Unit 6: Air and Noise Pollution

Repeated Questions:

1. **Explain the effects of air pollution on human health. / Describe effect of Air pollution on man and material. / Explain effects of air pollutant on human health.** (W25 - Q5(c), 07; W24 - Q5 OR(b), 04; W23 - Q5(b), 04)
2. **Give classification of air pollutants. / Give classification of air pollutants and explain in brief various sources of air pollutants.** (S25 - Q5 OR(b), 04; S23 - Q5(a), 03; W23 - Q5 OR(c), 07)
3. **Explain different measures for control of noise pollution. / Describe the methods of controlling noise pollution. / How is Noise measured? Describe the methods of controlling Noise pollution.** (S25 - Q5(c), 07; W23 - Q5 OR(a), 03; S24 - Q3 OR(a), 03)

Other Important Questions:

1. **Explain working of a trickling filter with neat sketch.** (S25 - Q5 OR(c), 07)
2. **Explain how Noise pollution affect working efficiency of human being.** (W24 - Q5 OR(a), 03)
3. **Enlist different air pollutants and explain any two in detail.** (W24 - Q5 OR(c), 07)
4. **Explain primary and secondary air pollutants.** (S24 - Q3 OR(b), 04)
5. **What is noise pollution? State the sources of it.** (W22 - Q5 OR(a), 03)
6. **Explain the effects of air pollution on men, material and animals.** (W22 - Q5 OR(b), 04)
7. **Differentiate between "Sound and Noise".** (W25 - Q5(a), 03)
8. **Define the following terms. (1) Garbage (2) Leachate (3) putrefaction (4) refuse.** (W25 - Q5(b), 04)
9. **What is dB? Explain the effects of noise pollution.** (S22 - Q4 OR(a), 03)
10. **Explain the effect of air pollution on plants, building material and human health.** (S23 - Q5 OR(c), 07)

Unit 7: Environment Impact Assessment (EIA)

Repeated Questions:

1. **Explain the role of EIA in achieving the goal of sustainable development. / Discuss in brief "EIA".** (S25 - Q4(b), 04; W23 - Q5 OR(b), 04)

Other Important Questions:

1. **Explain with flow chart, the steps used for Environment Impact Assessment.** (S23 - Q4(b), 04) *[Diagram given - refer Question paper of S23]*
2. **Write short note on EIA.** (W24 - Q5(a), 03) *[Also listed in Unit 5, but primary topic is EIA]*

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