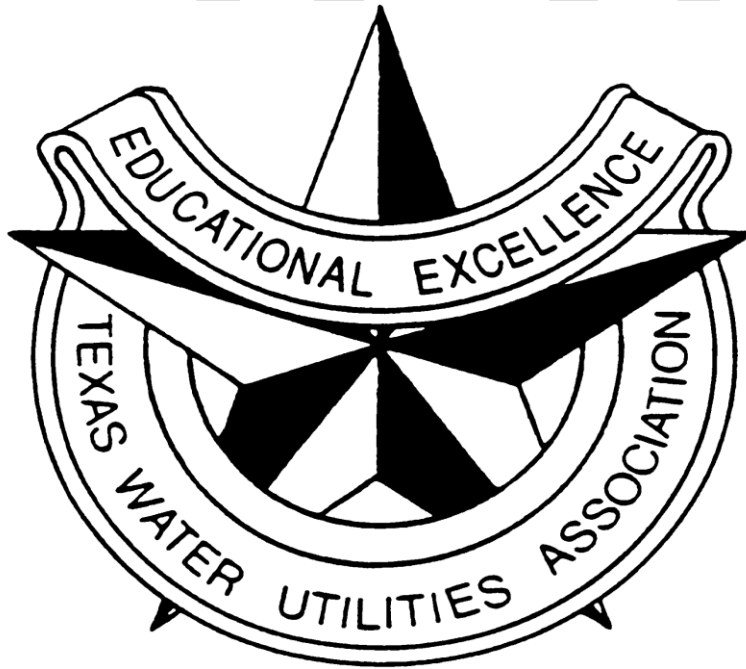


# Wastewater Operator

Study Material

“D” Wastewater



The following study questions were developed to assist the operator in the preparation process for taking a state licensing exam.

While we feel the questions provide a broad sample of the type of questions one might expect on the state exam, TWUA and staff in no way implies, guarantees, or suggests that an operator who uses, studies, or knows the following material will pass the state exam. The following is only intended to offer an additional study tool.

While TWUA and staff have proofed the questions and answers, it is possible however that some of the answers could be found in conflict with written materials. If you doubt or question the answer key PLEASE refer to written materials and use the answer that YOU feel best fits the question.

We hope that you will find this study guide useful and we wish you the best of luck on your state exam.

## Wastewater Questions

### "D" Wastewater

These **ARE NOT** actual Test Questions !!!

1. The name of the State Agency responsible for enforcing pollution control laws in Texas is –
  - a. Texas Water Development Board
  - b. Texas Water Commission
  - c. Texas Section of EPA
  - d. Texas Commission on Environmental Quality
  - e. Texas Water Resource and Conservation Commission
  
2. The term "pathogen" means –
  - a. Aerobic Bacteria
  - b. Anaerobic Bacteria
  - c. Fecal Matter
  - d. Coliform Bacteria
  - e. Disease Causing
  
3. The minimum separation between sewer lines and potable water lines is –
  - a. 5 feet
  - b. 7 feet
  - c. 9 feet
  - d. 11 feet
  - e. 24 feet
  
4. A licensed wastewater operator is a professional who –
  - a. Consistently does the best job possible
  - b. Practices personal safety
  - c. Strives to improve job knowledge
  - d. Strives to keep the plant and collection system in the best appearance and working order
  - e. All the above
  
5. The Biochemical Oxygen Demand (BOD) of a sample is based on –
  - a. pH readings
  - b. Measuring Total Suspended Solids (TSS) of a sample
  - c. Measuring the Dissolved Oxygen (DO) used
  - d. Measuring the anaerobic decomposition
  - e. Measuring total detention time

6. What is the most important role of aerobic bacteria in the treatment of wastewater?
  - a. Enhance organic matter
  - b. Decompose organic matter
  - c. Introduce workers to dangerous diseases
  - d. Enhance oxygen production
  - e. Produces Odor and Offensive Smells
  
7. Which of the following are dangerous gases that are likely to be present in lift stations and or manholes?
  - a. Methane gas and Petroleum fumes
  - b. Hydrogen Sulfide and Carbon Dioxide
  - c. Hydrogen, Sulfur, and Argon
  - d. Oxygen, Nitrogen and Helium
  - e. Both a & b
  
8. A preferred and most common method of cleaning sewer lines is –
  - a. Cable & Auger
  - b. Continuous Roding Machine
  - c. Hydro Jet Cleaner
  - d. Bucket & Belt Press
  - e. Both a & d
  
9. Which of the following are ways to reduce bad odors coming from a collection system?
  - a. Aeration & Air Scrubbers
  - b. Adding Enzymes To The Collection System
  - c. Routinely cleaning slow running or low flow lines
  - d. Adding Chlorine or Hydrogen Peroxide to the Collection System
  - e. Both c & d
  
10. The results of a Biochemical Oxygen Demand (BOD) sample taken at a treatment plant tells the operator –
  - a. How the plant is currently operating
  - b. How the plant was operating 5 days ago
  - c. How the plant was operating 10 days ago
  - d. Is of little benefit to the operator
  - e. How the plant will be performing at TCEQ inspection time

11. Which of the following would contribute to infiltration in a collection system?
  - a. Breaks in the main lines
  - b. High ground water levels
  - c. Heavy rains
  - d. Hydro jet cleaning plugged mains
  - e. a, b, & c
  
12. When a centrifugal pump loses prime, which of the following is most likely to result?
  - a. Pump sounds as though it is pumping gravel
  - b. Pump is no longer moving liquid
  - c. Check valve on the suction side of the pump slams closed
  - d. RPM of motor increases to compensate
  - e. a, b, & c
  
13. An operator's flow meter at the plant indicates there was 2.6 MGD flow through the plant. What is the GPM?
  - a. 1805
  - b. 18,055
  - c. 1083
  - d. 10,833
  - e. None of the above
  
14. Point source discharges are –
  - a. Discharges that show up in the system and at the plant from an unidentified or explained source.
  - b. Discharges that come from pipes or ditches that are monitored, controlled and inspected.
  - c. Discharges that have Intermittent, dispersed flows having little or no control.
  - d. Discharges that contribute greatly to the BOD and COD and typically come from dairies and farm related activities.
  - e. None of the above

15. An operator would anticipate Waste flows from Domestic sources to average–
  - a. 17 gallons per person per day
  - b. 100 gallons per connection per day
  - c. 100 gallons per person per day
  - d. 170 gallons per connection per day
  - e. 170 gallons per person per day
  
16. The wastewater plant operator is primarily responsible for –
  - a. Treating potable water to Safe Water Standards
  - b. Treating wastewater discharged from the community
  - c. Developing, implementing, and complying with budget
  - d. Collection and Containment of all non-point source water
  - e. Traffic law compliance while vehicles are on plant property
  
17. Non-Point Source Discharges are –
  - a. Discharges that have Intermittent, dispersed flows having little or no control.
  - b. Discharges that come from pipes or ditches that are monitored, controlled and inspected.
  - c. Discharges that come from municipalities, or industry.
  - d. Discharges that are high in BOD & typically come from food establishments.
  - e. None of the above
  
18. The Texas Commission on Environmental Quality can revoke an Operator's license if the operator –
  - a. Causes a permit violation, Falsifies records, or Neglects their duty
  - b. Causes a permit violation, is convicted of a Felony, or DWI
  - c. Knowingly violates plant permit under authority of the mayor
  - d. Causes an environmental impact event under direction of supervisor
  - e. TCEQ cannot revoke a license once it has been issued
  
19. If an accidental discharge, bypass, or spill (SSO) of wastewater occurs the responsible party MUST notify TCEQ regional offices within \_\_\_\_\_ hours.
  - a. 12 hours
  - b. 24 hours
  - c. 36 hours
  - d. 48 hours
  - e. 72 hours

20. Aerobic Bacteria require \_\_\_\_\_ in the water for their metabolism
- Nitrogen
  - Hydrogen
  - Oxygen
  - Either aerobic or anaerobic conditions
  - Cannot live with O<sub>2</sub> present
21. Chemical characteristics of sewage include –
- Solids, Grease, Dissolved Oxygen, O<sub>2</sub> Demand, pH, & gases
  - Liquids, Grease, BOD, Oxygen, pH, & gases
  - Solids, Grease, Oxygen, pH, & Organics
  - Water, Dissolved solids, Organics, Suspended Solids, & gases
  - Varies from system to system therefore there is no uniformity
22. Anaerobic Bacteria require \_\_\_\_\_ in the water for their metabolism
- Nitrogen
  - Hydrogen
  - Oxygen
  - Either aerobic or anaerobic conditions
  - Cannot live with O<sub>2</sub> present
23. \_\_\_\_\_ removes Total Suspended Solids (TSS)
- Chemicals
  - Aeration
  - Sedimentation
  - Detention
  - Filtration
24. Facultative Bacteria require \_\_\_\_\_ in the water for their metabolism
- Nitrogen
  - Hydrogen
  - Oxygen
  - Either aerobic or anaerobic conditions
  - Cannot live with O<sub>2</sub> present

25. Inorganic Solids include –
- a. Sand, Grit, & Minerals
  - b. Sand, Grease, & Organics
  - c. Grease, Grit, & Organic Solids
  - d. Organic materials from Plants, Animals, or Humans
  - e. Both a & d
26. A good pH for plant influent is about \_\_\_\_\_
- a. 6.5
  - b. 7.0
  - c. 7.2
  - d. 7.5
  - e. 8.0
27. Dissolved Solids in water –
- a. Plug Filters & Cause Odor Problems
  - b. Plug Filters & Cause Mud Balls
  - c. Pass Through A Filter
  - d. Increase the amount of detention time needed
  - e. Require removal if discharging into a receiving stream
28. The anaerobic decomposition of organic matter produces –
- a. Carbon Monoxide Gas
  - b. Hydrogen Sulfide Gas
  - c. Methane Gas
  - d. Liquefied Petroleum Gas
  - e. a, b, & c
29. Dissolved Oxygen (DO) in sewage indicates the sewage is –
- a. Septic
  - b. Contaminated
  - c. Fresh
  - d. High in Fats, Oils, & Grease
  - e. Low in pH
30. Organic Solids Include –
- a. Sand, Grit, & Minerals
  - b. Sand, Grease, & Inorganics
  - c. Grease, Grit, & Minerals
  - d. Organic materials from Plants, Animals, or Humans
  - e. Both a & d



31. Dangerous gases are produced during bacterial decomposition of organics in wastewater. The main gases are –
- Hydrogen Sulfide, Carbon Dioxide, & Methane
  - Hydrogen Sulfide, Carbon Monoxide, & Methane
  - Natural gas, Methane, & Hydrogen Sulfide
  - Ammonia, Methane, & Hydrogen Sulfide
  - Carbon Dioxide, Methane, & Ammonia
32. The majority of Dissolved Oxygen in raw sewage come from \_\_\_\_\_
- Inorganic Decomposition
  - Facultative Decomposition
  - Organic Decomposition
  - Organic Solids
  - Potable Drinking Water
33. Each person contributes approximately \_\_\_\_\_ lbs of BOD to the system daily.
- 0.17
  - 0.71
  - 1.7
  - 17
  - 17.4
34. If the operator of a system receives a call that a lift station is producing a strong smell of “Rotten Eggs” this would be an indication that –
- Hydrogen Sulfide Gas is present
  - Carbon Dioxide Gas is present
  - Methane Gas is present
  - Petroleum by-products are present
  - More chlorine should be added
35. Sources of wastewater include –
- Domestic, Storm Water, Commercial, Food Processing, Agricultural, & Industrial.
  - Domestic, Storm Water, Commercial, Agricultural & Hazardous
  - Domestic, Commercial, Agricultural, & Industrial
  - Commercial, Storm Water, Food Processing, & Industrial
  - Domestic, Commercial, Agricultural, & Industrial

36. A sewer manhole provides access into the system for cleaning or service. A manhole is typically located –
- At changes in pipe composition, grade, direction & intersection
  - At changes in grade, direction, intersections & or each 1,000 ft.
  - At changes in alignment, diameter, grade, direction, & intersection
  - At the discretion of the engineer & public works director
  - Where a sewer clean out is not feasible
37. Identify the Three Basic types of Life Stations –
- Closed, Open, & Manual
  - Dry, Wet, & Pneumatic
  - Dry, Wet, & Grind All
  - Gravity flow, Forced air, & Air over Hydraulic
  - Low Pressure, High Pressure, & Modified
38. New manholes must have an inside diameter of at least \_\_\_\_\_ feet and the entry access must be at least \_\_\_\_\_ inches.
- 3 feet and 24 inches
  - 4 feet and 24 inches
  - 4 feet and 30 inches
  - 5 feet and 30 inches
  - There is no current standard or requirement
39. The type of pump most commonly used in a lift station is –
- Positive Displacement
  - Split Case High Service Turbine
  - Submersible
  - Centrifugal
  - Sump Pump
40. In order to maintain two (2) feet per second velocity in a six (6) inch main line, the fall per 100 feet of pipe will be –
- 0.25 percent or 3 inches
  - 0.33 percent or 4 inches
  - 0.50 percent or 6 inches
  - 0.75 percent or 8 inches
  - 1.00 percent or 10 inches

41. The primary cause of stoppage in a collection system is \_\_\_\_\_ and \_\_\_\_\_
- Line breakage / Roots
  - Grit / Roots
  - Grease / Roots
  - Poor Construction / Roots
  - Customer Abuse / Grease
42. \_\_\_\_\_ gas is very toxic and deadens the sense of \_\_\_\_\_.
- Hydrogen Sulfide / Smell
  - Hydrogen Peroxide / Smell
  - Hydrogen Sulfide / Taste
  - Chlorine / Taste
  - Methane / Smell
43. Inflow and Infiltration (I&I) typically refers to –
- Plant load & Filter Capacity
  - Unaccounted for water in the system after heavy rains
  - Unaccounted for load typically from a septic tank waste hauler
  - The amount of chemical change in the system after heavy rains
  - The direction of flow into the plant and flow through the various treatment processes
44. Odors occur when treatment becomes –
- Aerobic
  - Anaerobic
  - Clogged
  - Overloaded
  - Infiltrated
45. Before entering a manhole the operator should test for \_\_\_\_\_ and oxygen levels and \_\_\_\_\_ the manhole before entering.
- Methane & Washout
  - Hydrogen Sulfide & Ventilate
  - All Hazardous Gases & Ventilate
  - Gases & Put on a SCBA & life line
  - Chlorine & Wait for a co-worker

46. Which of the following treatment devices is commonly used to separate and remove large solids from raw wastewater?
- A Grit Chamber
  - A Parshall Flume
  - A Mechanically raked bar screen
  - A Grease Trap
  - A Primary Clarifier
47. Which of the following diseases are caused by pathogenic organisms that may be present in raw wastewater?
- Hepatitis, Typhoid, Paratyphoid, Dysentery, Cholera
  - Gastroenteritis, Polio, Hookworm, & Giardiasis
  - Yellow fever, Scarlet fever, Smallpox, Chickenpox, Mumps,
  - a & b only
  - All the above
48. Which of the following is typically used to dewater sludge?
- Belt press
  - Drying beds
  - Solid bowl centrifuge
  - Gravity thickener
  - All the above
49. Calculate the volume in gallons of a rectangular aeration tank that is 60 feet long, 30 feet wide, and 20 feet deep. **Hint - (V=L X W X H X ?)**
- 26,928
  - 269,280
  - 36,000
  - 360,000
  - 4,812
50. Whenever wastewater cannot flow to the treatment plant by \_\_\_\_\_ a \_\_\_\_\_ is typically used.
- Gravity / Lift Station
  - Pressure / Pressure Pump
  - Gravity / Booster Pump
  - Pressure / Lift Station
  - Gravity / Positive Displacement Pump

51. A centrifugal pump must be \_\_\_\_\_ or it will not pump.
- Vented
  - Flushed Periodically
  - Primed
  - Phased to proper rotation
  - Properly Packed
52. One common type of weir design for measuring flow is –
- B-Knotch
  - C-Knotch
  - Z-Knotch
  - V-Knotch
  - Inverted Siphon
53. If the \_\_\_\_\_ loading on the plant is high, the operator would need to \_\_\_\_\_ Dissolved Oxygen (DO) levels.
- Inorganic / Decrease
  - Inorganic / Increase
  - Organic / Decrease
  - Organic / Increase
  - Surface / Restrict
54. A simple method for indicating when to waste sludge is –
- Mixed liquor suspended solids test
  - Sludge volume index test
  - Total Sedimentation Test
  - BOD Test
  - 30 minute settling test
55. Landfill applied sludge must have a solids content of at least \_\_\_\_\_ %
- 10 %
  - 15 %
  - 20 %
  - 25 %
  - There is no requirement or stipulation

56. Effluent dosage of chlorine in the contact chamber must produce a total combine residual of –
- 0.5 mg/L after 15 minutes
  - 0.5 mg/L after 20 minutes
  - 1.0 mg/L after 10 minutes
  - 1.0 mg/L after 20 minutes
  - 2.0 mg/L after 20 minutes
57. TCEQ allows the reuse of wastewater, some of these uses include –
- Irrigation, Aquifer Recharge, Cooling Towers, & Fire Protection
  - Irrigation, Cooling Towers & Fire Protection
  - Irrigation, Consumption by livestock, Gardens
  - Irrigation Only
  - Effluent water must be evaporated or used for irrigation only
58. How many gallons will a pump pumping 650-gpm produce in 24 hours?
- 15,600
  - 39,000
  - 93,600
  - 936,000
  - 9,360,000
59. Total solids in wastewater are the sum of –
- Settleable and Volatile Solids
  - Dissolved and Suspended Solids
  - Suspended and Grease Solids
  - BOD and COD Tests
  - Volatile and Inorganic
60. Which of the following would have an adverse effect on the proper settling of solids in a clarifier?
- Warm Temperature
  - A Two hour flow detention time in the clarifier
  - A Low surface loading rate
  - A properly designed, sized, & built clarifier
  - A Short Circuiting flow pattern

61. Typically Stabilization Ponds are no more than \_\_\_\_\_ feet deep –
- 2-4 feet deep
  - 3-5 feet deep
  - 4- 6 feet deep
  - 5-9 feet deep
  - 6-9 feet deep
62. A \_\_\_\_\_ valve is the most common valve found in the collection system
- Reduced Pressure Zone (RPZ)
  - Testable Double Check
  - Globe Valve
  - Gate Valve
  - Check Valve
63. To dispose of Grit, Grease, and Screenings the operator may –
- Burn (on days of low winds)
  - Direct Bury on site
  - Allow to accumulate on site since it will be small amounts
  - Add acids and chemicals to emulsify then re-introduce
  - Dispose of in an approved Sanitary Landfill.
64. In treatment – the Primary Clarifier should remove about \_\_\_\_\_ percent of the incoming BOD.
- 20 – 30 %
  - 30 – 40 %
  - 40 – 50 %
  - 50 – 60 %
  - 60 – 75 %
65. To manage water levels in pumping facilities the operators rely on –
- Floats, Pneumatic Bubblers, Electric Probes, Ultrasonic
  - Manual operation, Mechanical Timers, Mercury Switches, Probes
  - Floats, Electrodes, Laser Levels, Programmable Timers
  - Timers, Floats, Electrodes, Ultrasonic, Laser level
  - Pumping levels remain constant and pumps run continuously
66. Primary Clarifiers should remove approximately \_\_\_\_\_ percent of the Settleable Solids?
- 50 – 60 %
  - 60 – 75 %
  - 75 – 85 %
  - 90 – 95 %
  - None of the above

67. Activate Sludge Treatment is a \_\_\_\_\_ process?
- Anaerobic
  - Aerobic
  - Facultative
  - Modified Fixed Film
  - Extended Aeration
68. There are 4 basic components to a Trickling Filter and they are –
- Media, Underdrains, Tank, Distributor
  - Media, Air Diffusers, Distributor, Extended Aeration
  - Media, Tank, Distributor, Electric motors
  - Media, Underdrains, Distributor, Bar screen
  - Media, Square Structure, Air Diffusers, Transfer Pump
69. All the following are considered problem areas for Trickling Filter operation -
- Filter Flies, Odor, Ponding Clogged Nozzles, Mud Balls
  - Filter Flies, Odor, Ponding, Clogged Nozzles, Snails
  - Filter Flies, Ponding, Snails, Electrical Failure
  - Filter Flies, Ponding, Short Circuiting, Poor efficiency
  - Both a & b
70. Typically Facultative Ponds are no more than \_\_\_\_\_ feet deep –
- 2-4 feet deep
  - 3-5 feet deep
  - 4-6 feet deep
  - 6-8 feet deep
  - 6-10 feet deep

We genuinely hope that you have found this study material useful. The above questions are NOT copied from the state exam. You will NOT see the same wording or math on the state exam. This is simply a study guide.

Neither TWUA nor any staff thereof; implies that by knowing or memorizing these study questions - you will successfully pass the TCEQ state exam.

It is our position that if you read the Basic Water Manual – Listen and Participate in Class - Complete the Chapter Review Questions at the end of each chapter – and test your knowledge with this practice exam – You should do well on the state exam.

***The TCEQ State Exam will be 50 Questions – Good Luck !!!***