

Practice Exams Grade I Treatment

*The Division of Water Quality
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any answers provided herein.*

1. Each 100 gallons of groundwater infiltration per day into a sanitary sewer system reduces the usable capacity of the system by about
 - A. 1 person.
 - B. 3 persons.
 - C. 5 persons.
 - D. 10 persons.
2. A separate sewer system is a system in which
 - A. Sewers are laid 10 or more feet from water mains.
 - B. Storm water is carried in a system different than that carrying domestic wastewater.
 - C. The business section of the town has special type sewers.
 - D. The industrial wastes are separated from the domestic wastes.
3. The most important class of organisms in wastewater treatment is
 - A. Bacteria.
 - B. Enzymes.
 - C. Fungi.
 - D. Protozoa.
4. At the present time, which one of the following is the most widely accepted test to determine the strength of raw domestic wastewater and the probable effect of a treated effluent on the receiving stream?
 - A. BOD (biochemical oxygen demand) test.
 - B. COD (chemical oxygen demand) test.
 - C. DO (dissolved oxygen) test.
 - D. TSS (total suspended solids) test.
5. Sand, silt and grit are mainly composed of _____ matter.
 - A. Colloidal.
 - B. Inorganic.
 - C. Organic.
 - D. Volatile.
6. Hydrogen sulfide gas smells like
 - A. Dead fish.
 - B. Fuel gas.
 - C. Rotten eggs.
 - D. Skunk.
7. The activated sludge process is a(n) _____ wastewater treatment process.
 - A. Aerobic.
 - B. Anaerobic.
 - C. Pathogenic.
 - D. Synergistic.
8. The primary purpose of forced draft ventilation in lift stations is to
 - A. Cool the pumps.
 - B. Keep air pressure equalized.
 - C. Prevent odors.
 - D. Remove dangerous gases.

9. When working in manholes, at least _____ people should be available for lifting operators from the manhole in the event of serious injury.
- A. 1.
 - B. 2.
 - C. 3.
 - D. 4.

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15. If the pH value of a liquid is less than neutral, the liquid is
- A. Acidic.
 - B. Basic.
 - C. Supersaturated.
 - D. Undersaturated.
16. One gallon of water weighs _____ pounds.
- A. 7.5.
 - B. 8.3.
 - C. 32.2
 - D. 62.4

17. GPM means gallons per
 - A. Mile.
 - B. Milliliter.
 - C. Minute.
 - D. Month.

18. Organic solids in wastewater are
 - A. Generally of animal and vegetable origin.
 - B. Inert and not subject to decay.
 - C. Mostly dissolved solids.
 - D. Mostly settleable solids.

19. The major ingredient of domestic wastewater is
 - A. Dissolved solids.
 - B. Grease.
 - C. Settleable solids.
 - D. Water.

20. When organic wastes are discharged to receiving waters, oxygen is depleted by
 - A. Algae during the day.
 - B. Bacteria.
 - C. Ducks.
 - D. Limestone rocks.

21. What pump will not be seriously damaged if the discharge valve were closed for a short time while the pump is running?
 - A. Centrifugal pump.
 - B. Gear pump.
 - C. Plunger pump.
 - D. Positive displacement pump.

22. A centrifugal pump with a positive head on the suction side does not need to be
 - A. Checked.
 - B. Primed.
 - C. Started.
 - D. Valved.

23. On a centrifugal pump, additional grease above that recommended by the manufacturer may
 - A. Cause bearings to overheat.
 - B. Decrease maintenance.
 - C. Increase speed of pump.
 - D. Prolong pump life.

24. Which of the following items need not be monitored during operation of an internal combustion engine?
 - A. Air temperatue.
 - B. Oil pressure.
 - C. Oil temperature.
 - D. Water temperature.

26. Leakage of seal water around the packing on a centrifugal pump is required because it acts as a(an)
- A. Antifreeze.
 - B. Corrosion inhibitor.
 - C. Noise suppressant.
 - D. Sealant to keep out dirt.
27. A pump can deliver 400 gallons per minute at a total head of 184.8 feet. What is the pressure equivalent to this head, expressed in pounds per square inch?
- A. 42.7 PSI.
 - B. 80 PSI.
 - C. 427 PSI.
 - D. None of the above.
28. A sludge pump with a 12-inch bore and a 6-inch stroke pumps 45 cycles per minute. How many gallons does the pump deliver per minute assuming 100% efficiency?
- A. 2.4 gallons.
 - B. 66 gallons.
 - C. 132 gallons.
 - D. 147 gallons.
29. When replacing piping in your chlorinator, be sure to
- A. Replace with steel lines only.
 - B. Replace with CIP only.
 - C. Replace with corrosion resistant piping only.
 - D. No special requirement.
30. How many gallons will 1,200 feet of 6-inch pipe hold?
- A. 1,760 gallons
 - B. 1,962 gallons.
 - C. 3,525 gallons.
 - D. 3,925 gallons.
31. Over-lubrication of a universal joint will
- A. Block water lubrication line.
 - B. Damage seal.
 - C. Have no effect.
 - D. Increase life of joint.
32. Pumps must be lubricated
- A. Before they become noisy.
 - B. In accordance with manufacturer's recommendations.
 - C. Once a year.
 - D. Only if they are noisy.

38. When lubricating electric motors, avoid
- A. High pressure needle point grease gun.
 - B. Low viscosity lubricant.
 - C. Mixing petroleum base grease with silicon base grease.
 - D. Using automatic relief fittings.
39. The invert of a pipe is located
- A. According to the pipe manufacturer's specifications.
 - B. At the inside bottom of the pipe.
 - C. At the inside cross section.
 - D. At the outside bottom of the pipe.
40. Check valves are used to
- A. Permit air to escape from the pipe.
 - B. Permit flow in only one direction.
 - C. Regulate velocity.
 - D. Stop flow in both directions.
41. The most important item you should do before starting any gasoline engine is to check the
- A. Gasoline level.
 - B. Oil level.
 - C. Spark plug.
 - D. Timing.

42. What information must be on a warning tag attached to a switch that has been locked out?
- A. Directions for removing tag.
 - B. Name of nearest physician to call in case of an emergency.
 - C. Signature of person who locked out switch and who is the only person authorized to remove tag.
 - D. Time to unlock switch.
43. The water seal pressure in a water-lubricated pump should be at least _____ the pump discharge pressure.
- A. 10 psi less than.
 - B. 5 psi less than.
 - C. Equal to.
 - D. 5 psi more than.
44. Which of the following are the first external signs of mechanical failure in a gear mechanism?
- A. Excess heat, incorrect speed and excess noise.
 - B. Excess heat, incorrect speed and excess vibration.
 - C. Excess noise, excess vibration and burned odor.
 - D. Incorrect speed, excess noise and excess vibration.
45. In starting up a positive-displacement sludge pump, the suction valve should be
- A. Closed and the discharge valve open.
 - B. Closed and the discharge valve closed.
 - C. Open and the discharge valve open.
 - D. Open and the discharge valve closed.
46. When the plant is operating properly, the color of the liquid in the aeration tank of an activated sludge plant should be
- A. Black.
 - B. Brown.
 - C. Clear.
 - D. Gray.
47. The most important reason for washing hands thoroughly after taking a wastewater sample is to
- A. Avoid being infected by pathogenic bacteria.
 - B. Avoid contaminating the BOD bottles.
 - C. Avoid smudging the BOD bottles.
 - D. Get the slime off your hands so you won't accidentally drop any glassware.
48. The color of a properly operating waste stabilization lagoon should be
- A. Blue.
 - B. Brown.
 - C. Colorless.
 - D. Green.
49. At what time of day is the dissolved oxygen of a stabilization pond normally lowest?
- A. Midafternoon.
 - B. Midmorning.
 - C. Sunrise.
 - D. Sunset.
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50. In sampling wastewater for a BOD analysis at a lift station, the best results are obtained from a
- 24-hour composite sample.
 - Grab sample taken at time of high flow.
 - Grab sample taken at time of low flow.
 - Sample made up of two or three portions taken at times of high flow.
51. When starting up a lagoon, it is best to add wastewater when the
- Bottom is seeded with sodium nitrate.
 - Cross over pipes are open.
 - Lagoon has at least one foot of water in it.
 - Temperature is below 50 degrees Fahrenheit.
52. What is the immediate effect on other process units when there are broken bars on the bar screen?
- Rags accumulate in the grit.
 - Increased BOD in final effluent.
 - Decreased gas production in the digester.
 - Increased settleable solids in primary clarifier effluent.
53. If you encounter a liquid chlorine leak in a one-ton cylinder, what action will immediately help to reduce the effect of the leak?
- Spray it with water.
 - Apply ice to leaking area.
 - Spray it with ammonia solution.
 - Rotate cylinder so leak is in uppermost position.
54. Chlorine gas
- Is lighter than air.
 - Is heavier than air.
 - Is pink in color.
 - Will liquify at 70 degrees F.
55. How frequently should the temperature on a heated anaerobic digester be allowed to drop below 95 degrees Fahrenheit?
- Never.
 - Only at night.
 - Only on weekends.
 - None of the above.
56. A composite sample will provide a(an)
- Even color.
 - High pH.
 - Low solids sample.
 - Representative sample.
57. Sludge should be pumped from the primary settling tank to the digester
- Based on the digester volatile solids loading rate.
 - Rapidly, as needed.
 - Slowly and as frequently as needed.
 - Whenever gas bubbles and floating sludge begin to appear.

58. Dike vegetation should be controlled by
- Mowing periodically.
 - Burning in the spring and fall.
 - Allowing the cattle to graze on the dikes.
 - Any of the above would be acceptable.
59. A lagoon operator collects a sample of effluent at 2:15 p.m. on a sunny July day and tests it for dissolved oxygen. The dissolved oxygen is 22 mg/l and the pH is 9.2. The lagoon has a green color. Effluent suspended solids have been running at 75 mg/l. The operator should
- Do nothing. The conditions described are normal.
 - Apply algacide to the lagoon to kill the algae.
 - Drawdown the lagoon to eliminate excess DO.
 - Isolate cell.
60. Drip traps or condensate traps on anaerobic digesters should normally be drained at least
- Daily.
 - Twice a week.
 - Weekly.
 - Monthly.
61. During anaerobic digestion, at what frequency should mixing be applied?
- 12 hours per day.
 - 2 hours per shift.
 - 45 minutes per hour.
 - Constantly.
62. Proper operation of a sludge drying bed is to
- Add additional wet sludge on top of the dried sludge until the bed becomes completely filled.
 - Backflush underdrains weekly with strong chlorine solutions to improve drying.
 - Permit weed and grass growth to improve drying.
 - Remove all dried sludge prior to drawing new sludge.
63. Increasing the detention time in lagoons tends to _____ in the effluent.
- Decrease pathogenic bacteria levels.
 - Increase pathogenic bacteria levels.
 - Increase the virulence of pathogenic bacteria.
 - Not affect bacteria levels.
64. Calculate the removal efficiency of a primary tank if the influent BOD is 200 mg/L and the effluent BOD of the tank is 140 mg/L.
- 15%.
 - 30%.
 - 43%.
 - 60%.
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65. Calculate the detention time for a sedimentation tank that is 48 feet wide, 210 feet long and 9 feet deep with a flow of 5 MGD.
- A. 3.25 hours.
 - B. 3.63 hours.
 - C. 5.65 hours.
 - D. 5.82 hours.
66. What is the capacity of a sedimentation basin 80 feet long, 28 feet wide and 9.5 feet deep? Give your answer in gallons.
- A. 177,250 gallons.
 - B. 159,200 gallons.
 - C. 2,845 gallons.
 - D. 2,555 gallons.
67. A trickling filter 100 ft. in diameter and 6 ft. deep receives a flow of 0.5 mgd with a BOD of 150 mg/L. What is the BOD loading in pounds per day per 1000 cubic feet of filter media?
- A. 11.9.
 - B. 13.3.
 - C. 26.8.
 - D. 133.
68. Calculate the depth the liquid level must be lowered in the fall below the normal 3-foot depth to prepare for winter and provide 180 day storage.
- DATA: Wastewater stabilization ponds total area of 13.8 acres (600,000 sq. ft.)
Average winter wastewater flow to the ponds is 100,000 gpd.
Maximum liquid storage depth is 5 feet.
(Assume no loss of liquid by percolation or evaporation and that the ponds will fill to the maximum storage level of 5 feet.)
- A. 0.1 ft.
 - B. 1.0 ft.
 - C. 2.0 ft.
 - D. 4.0 ft.
69. The volume of an aerated pond is 700,000 cubic feet. Flow to the pond averages .050 MGD. How many days detention time does the pond provide?
- A. 10.5 days.
 - B. 14 days.
 - C. 105 days.
 - D. 140 days.
70. How much chlorine is needed to provide 10 mg/L dosage for a flow of 2 mgd?
- A. 75 lbs.
 - B. 83 lbs.
 - C. 130 lbs.
 - D. 167 lbs.

71. What should be the chlorine dose of an effluent that has a chlorine demand of 2.2 mg/L and a residual of 0.3 mg/L is desired?
- A. 0.3 mg/L.
 - B. 1.9 mg/L.
 - C. 2.2 mg/L.
 - D. 2.5 mg/L.
72. At the beginning of a day, a totalizer on the plant influent meter reads 2,813,572 gallons. The next morning, the totalizer reads 4,612,931 gallons. The average daily flow during the 24-hour period was approximately
- A. 0.18 MGD.
 - B. 0.8 MGD.
 - C. 1.8 MGD.
 - D. 2.8 MGD.
73. How should you unplug a sludge line that is partially clogged by grease?
- A. Mechanical scraping.
 - B. Install Teflon liner.
 - C. Use hot detergent mixture.
 - D. None of the above.
74. Which of the following chemicals will remove septic areas in a new lagoon?
- A. Calcium oxide or ferric oxide.
 - B. Calcium sulfate or sodium chloride.
 - C. Hydrogen sulfide or sulfuric acid.
 - D. Sodium nitrate or ammonia nitrate.
75. Raw sludge pumping cycles that are too short will
- A. Cause wastestream going to secondary treatment to turn dark.
 - B. Decrease return and waste sludge suspended solids.
 - C. Increase amount of grit in raw sludge.
 - D. Increase rags in raw sludge.
76. If you are having problems achieving adequate disinfection, possible causes include
- A. Chlorinator overfeeding.
 - B. Chlorine being consumed by organic matter
 - C. Contact time too long.
 - D. Insufficient chlorine demand.
77. In a two-stage anaerobic digestion system, what is the intended function of the secondary digester?
- A. Acid formation.
 - B. Primarily for gas production.
 - C. Separation of gas from supernatant.
 - D. Solids settling.
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78. The purpose of a sludge drying bed is to
- Convert digested sludge into a good fertilizer.
 - Provide for the digestion of sludge.
 - Provide storage space for digested sludge.
 - Provide for the separation of water from the digested sludge.
79. At what level should the exhaust be drawn off in a chlorination room?
- At chest height.
 - At least two feet above the height of the chlorine cylinder.
 - Near the ceiling.
 - Near the floor.
80. Which of the following are safe procedures for handling chlorine cylinders?
- Keep cylinders close to direct heat to prevent freezing.
 - Protective cap should always be in place when moving a cylinder.
 - Roll cylinders in a horizontal position.
 - Store cylinders on their sides.
81. To keep the skimmer arm of a circular primary clarifier from freezing and bending or breaking in the winter, you should
- Check bar screen regularly and keep it clean.
 - Keep the clarifier free of ice.
 - Reduce the speed of the sludge rake.
 - Remove the wiper blade during severe cold spells.
82. A properly designed and operated wastewater stabilization pond will remove _____ percent BOD.
- 40%-60%.
 - 60%-70%.
 - 70%-80%.
 - 80%-90%.
83. In the collection of a sample for bacteriological analysis, the sample bottle should always be
- Colored.
 - Metal.
 - Plastic.
 - Sterile.
84. Well-digested sludge should have volatile solids content in the range of
- 20-30%.
 - 40-50%.
 - 60-70%.
 - 80-90%.

85. If there is an insufficient supply of air or oxygen being introduced into the aeration tank of an extended aeration plant, the liquid in the tank will likely
- Contain a very fine light brown floc.
 - Contain very small air bubbles.
 - Have a black or blackish appearance and an offensive odor.
 - Have a dishwater appearance and a greasy odor.
86. Which of the following plants has a root system that would harm the seal in the pond?
- Cattails.
 - Duckweed.
 - Filamentous algae.
 - Shrimp weed.
87. A chlorine cylinder valve is thought to be leaking. If ammonia vapor is passed over the valve, the presence of a leak is indicated by
- A hissing noise.
 - A white cloud.
 - An odor of hydrogen sulfide.
 - Red smoke.
89. Short circuiting in primary treatment is undesirable because it may cause
- Electric motor failure.
 - Personal injury to the operator.
 - Poor quality effluent from the clarifier.
 - Too much sludge to be pumped to the digester.
90. If a sample of wastewater is known to be alkaline, which buffers should be used to standardize the pH meter?
- 1 and 5.
 - 4 and 7.
 - 7 and 10.
 - 11 and 13.
91. An operator cannot maintain adequate water levels in one of the ponds. What will cause this to happen?
- The pond is hydraulically overloaded.
 - The pond seal leaks.
 - The flow control structure leaks.
 - The flow control structure does not split the flow evenly.

92. The major problem caused by floating mats on a primary pond is
- Insect habitat.
 - Odors.
 - Reduced sunlight.
 - Reduced wind action.
93. The amperometric titration method is used to measure
- Alkalinity.
 - Chlorine residual.
 - pH.
 - Total hardness.
94. An operator should never enter a room containing a high concentration of chlorine gas without
- Staying low on the floor.
 - Holding breath and have help standing by.
 - Having self-contained air or oxygen supply and help standing by.
 - Covering nose and mouth with a wet handkerchief.
95. Given the following data, what is the most likely cause of the aerated pond problem?
- DATA: Turbulance over center part of pond.
Solids floating to surface on edge of pond.
DO in center portion = 1.4 mg/L.
- Hydraulic flow too slow through pond.
 - Inadequate aeration on edges on pond.
 - Sludge scraper not operating.
 - Toxic materials in pond.
97. When vandals are observed, you should
- Retain the vandals until the police arrive, even if force is necessary.
 - Try to obtain vehicle license numbers, descriptions of vandals, and number of people involved, but not try to detain or chase the vandals.
 - Wait until vandals have left, determine damage and if over \$1000, call police.
 - Yell at the vandals and try to make them go away.

99. Monitoring requirements for your wastewater facility may be found in
- A. 40 CFR 6.512.
 - B. Discharge permit.
 - C. EPA Monitoring procedures.
 - D. Federal Register.
100. Areas subject to higher than normal vandalism are usually
- A. Along heavily travelled streets.
 - B. Dark areas that are screened from sight of other buildings and street traffic.
 - C. Well-lighted, visible areas.
 - D. None of the above.

Answers

1 - A
2 - B
3 - A
4 - A
5 - B
6 - C
7 - A
8 - D
9 - B

15 - A
16 - B
17 - C
18 - A
19 - D
20 - B
21 - A
22 - B
23 - A
24 - A

26 - D
27 - B
28 - B
29 - C
30 - A
31 - B
32 - B

38 - C
39 - B
40 - B
41 - A
42 - C
43 - D
44 - C
45 - C

46 - B
47 - A
48 - D
49 - C
50 - A
51 - A
52 - A
53 - D
54 - B
55 - A
56 - D
57 - C
58 - A
59 - B
60 - A
61 - D
62 - D
63 - A
64 - B
65 - A
66 - B
67 - B
68 - C
69 - C
70 - D
71 - D
72 - C
73 - A
74 - A
75 - A
76 - B
77 - B
78 - D
79 - D
80 - B
81 - B
82 - D
83 - D
84 - A
85 - C
86 - A
87 - D
89 - C
90 - C

91 - B
92 - C
93 - C
94 - C
95 - B
97 - B
99 - B
100 - B

