Practice Exams
Grade I Treatment

The Division of Water Quality
makes no claim as the accuracy of
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.

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 temperature.  
   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.
50. In sampling wastewater for a BOD analysis at a lift station, the best results are obtained from a
A. 24-hour composite sample.
B. Grab sample taken at time of high flow.
C. Grab sample taken at time of low flow.
D. 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
A. Bottom is seeded with sodium nitrate.
B. Cross over pipes are open.
C. Lagoon has at least one foot of water in it.
D. 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?
A. Rags accumulate in the grit.
B. Increased BOD in final effluent.
C. Decreased gas production in the digester.
D. 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?
A. Spray it with water.
B. Apply ice to leaking area.
C. Spray it with ammonia solution.
D. Rotate cylinder so leak is in uppermost position.

54. Chlorine gas
A. Is lighter than air.
B. Is heavier than air.
C. Is pink in color.
D. 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?
A. Never.
B. Only at night.
C. Only on weekends.
D. None of the above.

56. A composite sample will provide a(an)
A. Even color.
B. High pH.
C. Low solids sample.
D. Representative sample.

57. Sludge should be pumped from the primary settling tank to the digester
A. Based on the digester volatile solids loading rate.
B. Rapidly, as needed.
C. Slowly and as frequently as needed.
D. Whenever gas bubbles and floating sludge begin to appear.
58. Dike vegetation should be controlled by
   A. Mowing periodically.
   B. Burning in the spring and fall.
   C. Allowing the cattle to graze on the dikes.
   D. 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
   A. Do nothing. The conditions described are normal.
   B. Apply algaecide to the lagoon to kill the algae.
   C. Drawdown the lagoon to eliminate excess DO.
   D. Isolate cell.

60. Drip traps or condensate traps on anaerobic digesters should normally be drained at least
   A. Daily.
   B. Twice a week.
   C. Weekly.
   D. Monthly.

61. During anaerobic digestion, at what frequency should mixing be applied?
   A. 12 hours per day.
   B. 2 hours per shift.
   C. 45 minutes per hour.
   D. Constantly.

62. Proper operation of a sludge drying bed is to
   A. Add additional wet sludge on top of the dried sludge until the bed becomes completely filled.
   B. Backflush underdrains weekly with strong chlorine solutions to improve drying.
   C. Permit weed and grass growth to improve drying.
   D. Remove all dried sludge prior to drawing new sludge.

63. Increasing the detention time in lagoons tends to
   A. Decrease pathogenic bacteria levels.
   B. Increase pathogenic bacteria levels.
   C. Increase the virulence of pathogenic bacteria.
   D. 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.
   A. 15%.
   B. 30%.
   C. 43%.
   D. 60%.
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.
78. The purpose of a sludge drying bed is to
A. Convert digested sludge into a good fertilizer.
B. Provide for the digestion of sludge.
C. Provide storage space for digested sludge.
D. Provide for the separation of water from the digested sludge.

79. At what level should the exhaust be drawn off in a chlorination room?
A. At chest height.
B. At least two feet above the height of the chlorine cylinder.
C. Near the ceiling.
D. Near the floor.

80. Which of the following are safe procedures for handling chlorine cylinders?
A. Keep cylinders close to direct heat to prevent freezing.
B. Protective cap should always be in place when moving a cylinder.
C. Roll cylinders in a horizontal position.
D. 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
A. Check bar screen regularly and keep it clean.
B. Keep the clarifier free of ice.
C. Reduce the speed of the sludge rake.
D. Remove the wiper blade during severe cold spells.

82. A properly designed and operated wastewater stabilization pond will remove ____ percent BOD.
A. 40%-60%.
B. 60%-70%.
C. 70%-80%.
D. 80%-90%.

83. In the collection of a sample for bacteriological analysis, the sample bottle should always be
A. Colored.
B. Metal.
C. Plastic.
D. Sterile.

84. Well-digested sludge should have volatile solids content in the range of
A. 20-30%.
B. 40-50%.
C. 60-70%.
D. 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
A. Contain a very fine light brown floc.
B. Contain very small air bubbles.
C. Have a black or blackish appearance and an offensive odor.
D. 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?
A. Cattails.
B. Duckweed.
C. Filamentous algae.
D. 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. A hissing noise.
B. A white cloud.
C. An odor of hydrogen sulfide.
D. Red smoke.

89. Short circuiting in primary treatment is undesirable because it may cause
A. Electric motor failure.
B. Personal injury to the operator.
C. Poor quality effluent from the clarifier.
D. 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?
A. 1 and 5.
B. 4 and 7.
C. 7 and 10.
D. 11 and 13.

91. An operator cannot maintain adequate water levels in one of the ponds. What will cause this to happen?
A. The pond is hydraulically overloaded.
B. The pond seal leaks.
C. The flow control structure leaks.
D. The flow control structure does not split the flow evenly.
92. The major problem caused by floating mats on a primary pond is
A. Insect habitat.
B. Odors.
C. Reduced sunlight.
D. Reduced wind action.

93. The amperometric titration method is used to measure
A. Alkalinity.
B. Chlorine residual.
C. pH.
D. Total hardness.

94. An operator should never enter a room containing a high concentration of chlorine gas without
A. Staying low on the floor.
B. Holding breath and have help standing by.
C. Having self-contained air or oxygen supply and help standing by.
D. 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.
A. Hydraulic flow too slow through pond.
B. Inadequate aeration on edges on pond.
C. Sludge scraper not operating.
D. Toxic materials in pond.

97. When vandals are observed, you should
A. Retain the vandals until the police arrive, even if force is necessary.
B. Try to obtain vehicle license numbers, descriptions of vandals, and number of people involved, but not try to detain or chase the vandals.
C. Wait until vandals have left, determine damage and if over $1000, call police.
D. Yell at the vandals and try to make them go away.
99. Monitoring requirements for your wastewater facility may be found in
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.
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