

Practice Exams Grade II Treatment

*The Division of Water Quality
makes no claim as the accuracy of
any answers provided herein.*

3. The volatile portion of suspended solids contained in normal domestic wastewater could be expected to be in the range of
 - A. Less than 10%.
 - B. 25-50%.
 - C. 70-80%.
 - D. 90-100%.

4. Sludge solids in wastewater have an average specific gravity of 1.20; this means they are
 - A. 12% heavier than water.
 - B. 20% heavier than water.
 - C. 2% lighter than water.
 - D. 20% lighter than water.

5. Products that are non-biodegradable will have _____ as compared with biodegradable products.
 - A. Same BOD.
 - B. A lower BOD.
 - C. A higher BOD.
 - D. There is no relationship between BOD and biodegradability.

6. If you come upon a co-worker who is not breathing, you should immediately
 - A. Apply cold compresses to the worker's forehead.
 - B. Check for bleeding.
 - C. Run for help.
 - D. Start CPR.

8. "Back siphonage" occurs when
 - A. Vacuum conditions exist.
 - B. Pressure increases.
 - C. An interconnection is made between the plumbing system in the building and water supply.
 - D. An open end of a water supply pipe is discharged in the plumbing fixtures.

9. Why are water based substances not used to extinguish fires in electrical equipment?
 - A. They are hard to get.
 - B. The fumes may be harmful.
 - C. The user may receive an electrical shock.
 - D. They will corrode the electrical contacts.

10. What is the first, immediate, action you should take if concentrated acid is spilled on the floor?
 - A. Pour sodium nitrate and wash with warm water.
 - B. Run to a shower and wash yourself thoroughly.
 - C. Sound the alarm.
 - D. Wash with water and neutralize with sodium bicarbonate (baking soda).

11. The power an electrical device can handle is called its _____ rating.
 - A. Frequency.
 - B. KVA.
 - C. L.
 - D. Voltage.

12. A particular electric motor is wound for 3-phase current. If one phase cuts out while it is in operation, the motor will
 - A. Continue to run without danger and will do a normal amount of work.
 - B. Continue to run without danger but the work done will be reduced one-third.
 - C. Overheat and will be damaged unless it is stopped by a thermal control device.
 - D. Stop immediately.

13. Where does wear most frequently occur on a plunger pump?
 - A. Cylinder.
 - B. Rotor.
 - C. Stators.
 - D. Volute.

14. As rotors or stators accumulate wear on progressive cavity pumps, the capacity of the pump is decreased. What is the easiest way to tell if the pump elements are worn?
- A. Tap into the line between the pump and the discharge valve and determine the pump capacity by timing how long it takes to fill a 20-liter pail.
 - B. Measure the pressure on the discharge side of the pump with valves open and the pump pumping.
 - C. Disassemble the pump, measure the parts and compare it to the original specifications.
 - D. Close the discharge valve and measure the resultant pressure.
15. What will cause the electrical disconnect for a motor to trip out?
- A. Clogged pump inlet.
 - B. Lack of grease.
 - C. Low temperature.
 - D. None of the above.
16. A centrifugal pump vibrates and is noisy. From the choices below, select the most probable cause.
- A. Impeller too small.
 - B. Foot valve too small.
 - C. Dirt or grit in sealing liquid.
 - D. Air in the pump.
17. Given the following data, what is the most likely cause of the pump problem?
- DATA: Pump is running.
Reduced discharge from lift station.
Impeller is clear.
Level sensors are operating properly.
- A. Improper packing.
 - B. Misaligned belt drives.
 - C. Pump air bound.
 - D. None of the above.
18. Fixed porous plate diffusers can be cleaned by scrubbing with
- A. Detergent.
 - B. A strong acid solution.
 - C. A strong chlorine solution.
 - D. A weak sodium hydroxide solution.
19. Excessive leakage around seals on the shafts and plungers of a plunger pump may indicate what?
- A. Attempting to pump against too great a head.
 - B. Excessive wear of the shaft and plunger.
 - C. The eccentric needs replacement.
 - D. The pump needs new ball checks.
20. Closing a valve too quickly may develop a condition known as
- A. Cavitation.
 - B. Tuberculation.
 - C. Venturi effect.
 - D. Water hammer.

- A. Pumps out of sequence.
 - B. Pumps run constantly.
 - C. Pressure switches open too soon.
 - D. Level of wet well is high.
23. In operating a small pumping station, which is provided with two identical pumps, it is best to adjust the controls so that
- A. One pump does most of the work and the second pump is held in reserve being operated intermittently to keep it in good running condition.
 - B. The pumps alternate in operation.
 - C. The pumps both turn on together.
 - D. None of the above.
24. Given the following information, calculate how many minutes a piston-type pump will have to run each day to remove the 4% sludge that accumulates.
- DATA: Pump will pump two (2) gallons per stroke.
Pump is set at 50 strokes/minute.
Raw flow = 1 MGD.
Raw suspended solids = 200 mg/L.
Primary effluent suspended solids = 100 mg/L.
- A. 25 minutes.
 - B. 44.5 minutes.
 - C. 95 minutes.
 - D. 210 minutes.
25. You have just reinstalled a three-phase, 220 volt electric motor after it has been rewound. It starts to run in the wrong direction. The corrective action is to
- A. Change the ground wire.
 - B. Check the motor starter.
 - C. Reverse the connection of any two motor leads.
 - D. Send it back to the motor repair shop to be properly rewound.

26. What test is used to determine the organic matter found in the mixed liquor?
- A. COD.
 - B. MLSS.
 - C. MLVSS.
 - D. TOC.
27. You run a settleability test on the mixed liquor of your aeration tank. In five minutes, the sludge settles to 50 mls out of 1 liter. This tells you that
- A. The sludge is in good shape.
 - B. You should increase the aeration.
 - C. You should waste less sludge.
 - D. You should waste more sludge.
28. Given the following data, what is the most likely cause of the anaerobic digester problem?

DATA: Raw sludge pump on.
Digester gas pressure high.
Gas pressure relief valve open.

- A. Vacuum relief valve stuck open.
- B. Too much raw sludge feed.
- C. Supernatant line pugged.
- D. Digester cover seal broken.

-
30. If a chlorinator is connected to the bottom valve of a half full one-ton cylinder, the chlorinator is withdrawing
- A. Chlorine gas.
 - B. Liquid chlorine.
 - C. Liquid or gas chlorine, depending upon temperature.
 - D. Nothing, since there is only one connection.

-
32. Flocculation is best accomplished by
- A. Decreasing alkalinity.
 - B. Gentle agitation.
 - C. Increased sunlight.
 - D. Rapid mixing.

33. The approximate pH for good nitrification is closest to
A. 6.5.
B. 7.0.
C. 8.5.
D. 10.0.
34. The pH in an aerobic digester may decrease due to
A. The aerobic destruction of alkalinity.
B. Production of CO and nitrate ions.
C. Oxidation of H₂S to sulfuric acid.
D. An increase in volatile acids.
-
36. Your aeration tank has a d.o. of 0.2 mg/L near the inlet end and 6.1 mg/L near the outlet. Blowers are all on full speed. Which of the following operational controls will raise the DO at the inlet end?
A. Waste more sludge.
B. Throttle diffusers.
C. Chlorinate influent to aeration tank.
D. Add sodium nitrate at influent to aeration tank.
37. How would you determine if a gas mixing system is plugged or otherwise malfunctioning in your anaerobic digester?
A. By measuring the blower discharge pressure.
B. By measuring the temperature throughout the digester.
C. By observing amount of gas production.
D. By visual observation through the inspection port.
38. Lowering the vat depth of a vacuum filter is most likely to produce _____ cake.
A. Wetter.
B. Thicker.
C. Stronger.
D. Dryer.
39. What is the digester efficiency if the volatile solids concentration entering an anaerobic digester is 70% and the volatile solids concentration leaving the digester is 50%?
A. 29%.
B. 40%.
C. 57%.
D. 71%.

40. Calculate the organic load in lbs of BOD/day/1000 cu. ft. for a trickling filter 50 ft in diameter and 8 feet deep, a BOD design loading of 50 lbs/day/1000 cu. ft., a flow of 250,000 gpd, and a primary effluent BOD to filter of 150 mg/L.
- A. 2 lbs/day/1000 cu. ft.
 - B. 5 lbs/day/1000 cu. ft.
 - C. 20 lbs/day/1000 cu. ft.
 - D. 50 lbs/day/1000 cu. ft.
41. Given the following data, calculate the suspended solids required to maintain a food to microorganism (F/M) ratio of 0.3.
- DATA: Daily flow = 1.0 MGD.
Average primary effluent BOD = 150 mg/L.
Aeration tank capacity = 200,000 gal.
- A. 2100 mg/L.
 - B. 2500 mg/L.
 - C. 3300 mg/L.
 - D. 4200 mg/L.
42. Given the following data, calculate the mean cell residence time (MCRT).
- DATA: Influent flow = 3.5 MGD.
MLSS = 2850 mg/L.
Waste sludge flow = 0.08 MGD.
Total secondary system volume = 2.0 MG.
Waste activated sludge suspended solids conc. = 6000 mg/L.
Final effluent suspended solids = 25 mg/L.
- A. 6 days.
 - B. 8 days.
 - C. 10 days.
 - D. 12 days.
43. In an activated sludge plant, it was determined that an SVI of less than 60 was good, between 60 and 80 was fair, and above 80 indicated bulking would soon follow. A test was made and the 30-minute settling volume was 15% and suspended solids were 3000 mg/L. Using the scale above, the results would be labeled as
- A. Fair.
 - B. Good.
 - C. Indicative of bulking.
 - D. None of the above. Not enough information was given to determine.
44. Calculate the waste sludge pumping rate if you want to waste 2,000 pounds per day with a concentration of return sludge at 5000 mg/L.
- A. 29 gpm.
 - B. 33 gpm.
 - C. 35 gpm.
 - D. 37 gpm.

51. Overaeration in the aeration basin will cause which of the following to occur in the secondary sedimentation basin?
- Improved settling of the activated sludge.
 - Increased oxygen uptake by the sludge.
 - Sludge bulking.
 - Small floc particles floating on tank surface.
52. The proper way to start up an anaerobic digester is to fill it
- Halfway with seed sludge, then add raw sludge slowly.
 - Up first with raw sludge and wastewater.
 - Up with waste activated sludge.
 - With seed sludge, add lime to pH 10 and mix.
53. In a low pressure wet oxidation unit's steam generator, the water being converted into steam should have a hardness of _____ grains per gallon.
- 0.
 - 2.
 - 5.
 - 7.
54. You have observed water spraying out of the vacuum filter's silencer (or snubber) exhaust pipe. Which of the following conditions is the most likely cause of the problem?
- Filtrate pump not functioning properly.
 - Vacuum too high.
 - Vacuum too low.
 - Worn check valves in vacuum system.
55. Analysis of a wastewater effluent from a standard rate trickling filter shows the following:
- Nitrite = 8 mg/L.
 - Ammonia = 2 mg/L.
 - Nitrate = 2 mg/L.
- What do these results indicate?
- Plant is operating properly.
 - Final end product, nitrite, is too low.
 - Final end product, nitrate, is too low.
 - DO was insufficient to allow complete aerobic oxidation of the nitrate to nitrite.
56. In the final clarifier of an activated sludge plant, the operator noted the following conditions. At times, small, almost transparent, very light fluffy, buoyant sludge particles (one-eighth to one-quarter inch in diameter) were rising to the clarifier surface near the outlet weirs. It appeared to be more pronounced at high return sludge flow rates. The final effluent was otherwise exceptionally clear, even though the condition occurred during relatively low surface overflow rates. Mixed liquor concentration was relatively low at this time. This situation is called
- Ashing.
 - Bulking.
 - Pin floc.
 - Straggler floc.

57. On the air driven RBC, a missing diffuser head will be indicated by
- A. Scoured 360 degree line.
 - B. Increased air temperature.
 - C. Increased rotational speed.
 - D. Airline vibration.
58. Given the following data, what is the most likely cause of the mechanically cleaned bar screen problem?

DATA: Normal dry weather flow.
Motor running but unit not operating.
Drive chain excessively tight.
Water differential across screen above 6 inches.
Controls on automatic.
Pin sheared or automatic clutch tripped.

- A. Bubble tube malfunction.
 - B. Flow too high.
 - C. Rocks lodged in screen.
 - D. Suction channel level too high.
59. Given the following data, what is the most likely cause of the grit separator problem?

DATA: Lower than normal flow of water and grit from apex.
High separation chamber pressure.

- A. Grit pump suction clogged.
 - B. Partial obstruction near apex.
 - C. Stick lodged in separation chamber.
 - D. Vortex finder worn.
60. What is the most likely cause of an aerated grit chamber problem if the grit pump is in automatic mode and running, the suction valve is wide open, the pressure on discharge line is low and erratic, and less than normal water and grit are discharging from discharge line?
- A. Discharge check valve partially plugged.
 - B. Grit classifier partially plugged.
 - C. Grit pump suction line partially plugged.
 - D. Malfunctioning air supply to grit chamber causing pump to get air bound.

61. Given the following data, what is the most likely cause of the primary sedimentation tank problem?

DATA: Raw sludge pumps run 10 minutes in each hour.
Raw sludge has 3% total solids at start of pumping cycle, 2% total solids at end.
No sludge accumulation on tank floor.
Slight sludge accumulation in sludge hopper.

- A. Raw sludge pumping duration too short.
- B. Raw sludge pumping duration too long.
- C. Raw sludge total solids too high.
- D. Sludge collectors running too long.

62. Given the data below, what is the most likely cause of the trickling filter problem?

DATA: Normal dry weather plant flow rate.
Sweep arms operating at normal rate.
Water not passing through as rapidly as normal.
Increased odor level.
Increased chlorine demand in final effluent.
Final effluent turbid.

- A. Filter media plugged with dead microorganisms.
- B. Low solids load to filter.
- C. Seal in sweep arms worn.
- D. Spray nozzles partially plugged.

63. Given the following data, what is the most likely cause of the activated sludge problem?

DATA: The aeration tanks in an activated sludge plant have maintained a stable white foam with a brownish tint less than one inch thick.
BOD removals have been at their normal high efficiency.
Settling of the activated sludge in the secondary clarifiers has been good - as is normal.
Air supplied to the system has been a normal 30,000 cfm, with a consistent DO of 2.5 mg/L.
MLSS has been maintained at 2,500 mg/L - normal.
Gradually during your shift the DO has risen to 5.0 mg/L.

- A. A toxic substance has affected the activated sludge.
- B. BOD loading on the aeration system has increased.
- C. Increased BOD loading has caused a corresponding increase in activated sludge activity.
- D. No change.

64. Given the following data, what is the most likely cause of the secondary sedimentation tank problem?

DATA: Sludge depth in tank too high.
Tank effluent turbid.
Tank effluent requiring above normal chlorine dosage.
Sweeparms in tank bottom operating.
Return activated sludge flow to aeration tank low.
Controls on return activated sludge pump on automatic.
Control sensors for return sludge operating normally.

- A. Accuracy of sludge depth measurement.
- B. Return activated sludge pump worn, needing repair.
- C. Speed of sweeparms travel.
- D. Sweep arm overload tripped.

65. An air flotation thickener will produce a thin float if

- A. Flight speed too high and skimmer wiper not adjusted properly.
- B. Excessive air/solids ratio and polymer dosages too low.
- C. High dissolved oxygen and flight speed too low.
- D. Polymer dosages too high and unit overloaded.

66. Given the following data, what is the most likely cause of the gas chlorinator problem?
DATA: Feed rate response is sluggish.
Maximum feed rate not reached.
Injector water low at high feed rate.
Injector water supply pressure normal.
Injector vacuum stays low with low feed rate.
- A. Clogged supply line.
 - B. Feed rate indicator clogged.
 - C. Injector clogged.
 - D. Vacuum loss.
67. When operating a multiple hearth incinerator, if the oxygen content of the stack gas is excessively high, what should you do?
- A. Adjust the scrubber spin damper.
 - B. Decrease air feed rate.
 - C. Decrease sludge feed rate.
 - D. None of the above.
68. Mud balls develop on a tertiary filter due to
- A. Floc carry-over onto the filter.
 - B. Heavy algae growth during long filter runs.
 - C. Improper or insufficient surface washing and backwashing.
 - D. Insufficient chlorine dosage to remove organic matter.
69. Possible corrective actions to solve microscreen problems when treating high concentrations of oil and grease include?
- A. Decreasing the drum rotation speed.
 - B. Decreasing the water spray pressure.
 - C. Placing fewer microscreens in service.
 - D. Reducing oil and grease loadings at source.
70. Which of the following conditions will probably cause the greatest change in pH?
- A. Buffering sample.
 - B. Exposing sample to atmosphere.
 - C. Fixing sample.
 - D. Refrigerating sample.
71. Select the most critical and essential aspect in the planning category from those listed below.
- A. Budget.
 - B. Manpower resources.
 - C. Supervisory experience.
 - D. Timing.

73. Supervisors have a duty to establish
- A. Just downward communication.
 - B. Just formal communication channels.
 - C. Only the grapevine or informal channel for communication.
 - D. Upward, downward and horizontal communication channels.
74. A situation where the supervisor encourages employees to make their own decisions in specified areas is considered to be
- A. Bad form since the supervisor eventually loses control.
 - B. Highly desirable, since it encourages employee growth and frees the supervisor for other tasks.
 - C. Ignoring rules that follow past experiences in decision-making
 - D. None of the above.
75. A foreman who has good supervisory ability will have a crew who will
- A. Always have their work done in less than the allotted time.
 - B. Be capable of performing outside the scope of their titles.
 - C. Constantly be asking questions about their work.
 - D. Continue to function effectively even in the foreman's absence.
76. "First in-first out" is a term used in
- A. Accounting for materials.
 - B. Assigning employees to a job.
 - C. Keeping the influent from going anaerobic.
 - D. Personnel regarding reduction-in-forces.
77. Which term describes the calculated amount by which the value of a plant's physical property declines annually due to wear and tear?
- A. Depreciation.
 - B. Rate base.
 - C. Rate of return.
 - D. Return on equity.
78. If no one is on call, who should handle a holiday emergency?
- A. Foreman.
 - B. General manager.
 - C. Operator.
 - D. The first person that reports to work on the next regular shift.
79. Key steps in a safety program would not include
- A. Controlling work habits.
 - B. Injury records for the operator.
 - C. Locating hazards.
 - D. Medical insurance for all employees.

80. Drainage well or sumps (which receive treatment basin drainage) must have their contents
- A. Returned to the head of the plant for treatment along with the raw wastewater.
 - B. Periodically pumped to the digester.
 - C. Discharged into the plant effluent to prevent treatment basin overload.
 - D. Chlorinated and discharged to the stream.
81. One limitation in using constant mixed liquor volatile suspended solids (MLVSS) or mixed liquor total suspended solids (MLTSS) as the control methodology for activated sludge treatment is
- A. In practice it is not possible to operate at a constant MLTSS or MLVSS.
 - B. It is based on consistency of raw waste load which seldom exists.
 - C. Most facilities don't have the lab equipment necessary to determine MLVSS.
 - D. None of the above.
82. Plant raw flow is low between midnight and 9 a.m. and then rises sharply to the normal daily high where it stays from 9 a.m. until midnight. How does the plant effluent quality respond to this flow variation?
- A. No change.
 - B. Effluent gets better as more flow serves to dilute contaminants.
 - C. Effluent quality changes but cannot be related to changes in flow.
 - D. Effluent quality gets worse as plant flow increases possibly due to higher hydraulic and organic loadings.
83. Oral warnings should take place
- A. By telephone.
 - B. In private interviews.
 - C. In public.
 - D. In speeches.
84. Why should the groundwater level be checked when draining tanks for inspection?
- A. So the tank contents may be used for watering of grounds if the groundwater table is too low.
 - B. To be sure the groundwater is down far enough so the tanks will not float.
 - C. To see if excessive exfiltration may be occurring.
 - D. To see if excessive infiltration may be occurring.
85. In reviewing reports, a supervisor
- A. Assigns an understudy to read everything carefully.
 - B. Does not really look at any of the reports.
 - C. Passes over the majority and concentrates on the exceptions.
 - D. Reads everything carefully.

86. The major purpose of an inventory of actual physical units is to
- Catch employees who have taken materials.
 - Check for significant differences in inventory records.
 - Comply with IRS and governmental finance department requirements.
 - Retire obsolete materials.
87. The most important factor in effective communication is
- Force.
 - Mutual agreement.
 - Mutual understanding of information.
 - Written information.
88. If you are indefinite when assigning responsibilities to your employees for work to be done, the result probably will be
- A high level of morale and job satisfaction on the part of your employees.
 - A noticeable increased desire on the part of your employees to assume responsibilities.
 - Friction, misunderstanding, and inefficient work by your employees.
 - Good training for your employees in all the details of the work of your office.
89. Occasionally, some of the personnel in a work crew will indulge in active horseplay. This should be
- Allowed only at coffee breaks.
 - Discouraged because some of the workers might not like it.
 - Encouraged because it promotes good fellowship.
 - Stopped immediately because it is likely to cause an accident.
90. Paint spread on bare concrete and masonry surfaces by vandals can best be removed by
- Acid.
 - Painting over it.
 - Paint remover.
 - Sand blasting.
91. The major reason why the person in charge of a public relations program should be a member of upper management is
- The ability to influence policy.
 - Being in a position of telling irate customers why they are wrong.
 - That no one in the lower ranks wants it.
 - The public accepts it better.
92. If a chemical costs \$30 per ton, how much will it cost per year to treat a flow of 1.5 MGD if the average dose is 18 mg/L?
- \$ 803.
 - \$1,110.
 - \$1,233.
 - \$1,506.

93. Your flow meter is under-registering 10% and the meter read 9,000 gallons. How much money did the utility lose if the billing rate is \$0.50 per 1000 gallons?
- A. \$0.25.
 - B. \$0.45.
 - C. \$0.50.
 - D. \$0.90.
94. The term "public relations" is best described as
- A. All contacts between the staff of the utility and those outside the staff.
 - B. An enlistment of all public employees in an effective work program.
 - C. The careful determination of what facts are to be made public.
 - D. The various forms of publicity used by the department.
95. Using the control function correctly means that employees work
- A. On their own, with no checkpoints.
 - B. On their own, with possible supervisory checks.
 - C. Hand in hand with the supervisor.
 - D. None of the above.
96. A worker notices that a necessary piece of equipment is defective. The current job needs to be finished as soon as possible. The worker should
- A. Consult with the other employees and reach a concensus agreement on what to do.
 - B. Continue the job but be cautious while using the defective equipment.
 - C. Hurry finishing the job before the equipment fails completely.
 - D. Report the defect but hold off completing the job until the equipment is repaired or replaced.
97. The effective supervisor is one who achieves
- A. The objectives of the employees, regardless of the supervisor's personal judgment.
 - B. The utility's objectives and those of the employees, even if this involves overtime.
 - C. The utility's objectives by convincing the employees that those are the objectives to follow.
 - D. A mutual harmony between the objectives of the employees and the utility, so that all are working toward the same goals.
98. One way a crew should not demonstrate to the utility that they are getting their money's worth is by
- A. Cutting corners so that every job is completed at less cost than estimated.
 - B. Performing preventive maintenance on equipment.
 - C. Proper use of material, equipment, personnel and time.
 - D. Training members of the crew.

-
100. The supervisor or middle manager has the most control over which type of motivation?
- A. Employee sense of achievement.
 - B. Fringe benefits.
 - C. Wages.
 - D. Working conditions.

Answers

3 - C
4 - B
5 - B
6 - C

8 - A
9 - C
10 - C
11 - B
12 - D
13 - A
14 - B
15 - A
16 - D
17 - C
18 - C
19 - B
20 - D

23 - B
24 - A
25 - C
26 - C
27 - A
28 - A

30 - B

32 - B
33 - C7
34 - C

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

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

91 - A
92 - C
93 - C
94 - A
95 - D
96 - D
97 - C
98 - A
100 - A

201. When organic wastes are discharged to receiving waters, oxygen is depleted by
- A. Algae during the day.
 - B. Bacteria.
 - C. Ducks.
 - D. Limestone rocks.
202. Employee hazards include
- A. Noxious or toxic gases or vapors.
 - B. Oxygen deficiency.
 - C. Physical injuries.
 - D. All of the above.
203. Hydrogen sulfide gives off an odor similar to
- A. Ammonia.
 - B. Chlorine gas.
 - C. Rotten eggs.
 - D. Decayed wood.
204. Coliform bacteria are
- A. Algae.
 - B. Coagulant aids.
 - C. Indicators.
 - D. Sequestering agents.
205. Three waterborne diseases are
- A. Mumps, measles, colds.
 - B. Scarlet fever, pneumonia, hay fever.
 - C. Typhoid fever, dysentery, cholera.
 - D. TB, diphtheria, chickenpox.
206. A cylindrical tank is 10 feet in diameter and 20 feet in height. What is the approximate capacity in liters?
- A. 44,450.
 - B. 31,030.
 - C. 5,942.
 - D. 4,445.
207. First aid for first-degree burns is to
- A. Bandage tightly.
 - B. Cover liberally with a salve.
 - C. Immerse in warm water.
 - D. Submerge the burned area in cold water.
208. Which of these pH readings indicates an acidic wastewater?
- A. 3.
 - B. 7.
 - C. 9.
 - D. 12.

209. If water weighs 8.34 pounds per gallon, how much will seven and one-half gallons weigh?
- A. 50 pounds.
 - B. 62.5 pounds.
 - C. 75.6 pounds.
 - D. 77 pounds.
210. One milliliter is what fraction of a liter?
- A. 1/10.
 - B. 1/100.
 - C. 1/1,000.
 - D. 1/100,000.
211. The normal cause of electric motor failure is
- A. Dirt.
 - B. Moisture.
 - C. Friction.
 - D. All of the above.
212. 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.
213. How many gallons of wastewater would 600 feet of 6-inch pipe hold, approximately?
- A. 740.
 - B. 880.
 - C. 900.
 - D. 930.
214. A water seal on a pump serves a dual purpose. It acts as a lubricant and it also
- A. Acts as a coolant to keep the pump bearing from overheating.
 - B. Keeps gritty material from entering the packing box.
 - C. Keeps the pump primed.
 - D. Is a reserve water supply.
215. The elevation of any pump above the source of supply should not exceed _____ feet.
- A. 2.2
 - B. 22
 - C. 200
 - D. 224
216. The three common types of plastic pipe are listed as: PVC, PE and ABS. These names refer to the
- A. Chemical resistance of the pipe.
 - B. Composition of the pipe.
 - C. Pressure for which the pipe is designed.
 - D. Types of appropriate application.

217. Prior to repairing a pump's electrical circuit, which of the following actions should you take?
- A. Disconnect the circuit breaker, place a red tag stating "do not activate," and lock out.
 - B. Notify your supervisor.
 - C. Tell all of the operators not to activate the circuit.
 - D. Turn pump off.
218. Pump maintenance includes
- A. Checking operating temperature of bearings.
 - B. Checking packing gland.
 - C. Operating two or more pumps of the same size alternately to equalize wear.
 - D. All of the above.
219. When carrying out a routine inspection on a centrifugal pump, it is noted by the operator that the bearings are excessively hot. This could be caused by
- A. Over lubrication.
 - B. Speed too slow.
 - C. Worn impeller.
 - D. Worn packing.
220. In a centrifugal pump, internal leakage is prevented by
- A. Impellers.
 - B. Sleeves.
 - C. Volute.
 - D. Wear rings.
221. A valve which allows water to flow in one direction only is a _____ valve.
- A. Check.
 - B. Gate.
 - C. Globe.
 - D. Petcock.
222. Pipe material that is the least susceptible to corrosion by acids formed from hydrogen sulfide gas is
- A. ACP.
 - B. CIP.
 - C. RCP.
 - D. VCP.
223. Centrifugal pump parts include
- A. Diaphragm.
 - B. Impeller.
 - C. Piston.
 - D. Rotor.
224. Which indicates a good quality domestic activated sludge?
- A. Black color and septic odor.
 - B. Brown color and musty odor.
 - C. Brown color and lots of dark brown foam.
 - D. Settleability of 900 mls in a 1 liter cylinder over a 30-minute period.

225. Which of the following forms of plant life is necessary for the proper functioning of a stabilization or oxidation pond?
- A. Algae.
 - B. Cattails.
 - C. Water lilies.
 - D. Weeds.
226. Cattails growing in lagoon will
- A. Cause short circuiting in affected lagoon.
 - B. Eliminate mosquito larvae.
 - C. Increase the diurnal pH fluctuations.
 - D. Increase toxic blue-green algae concentrations in the effluent.
227. At what time of day is the dissolved oxygen content highest in a lagoon?
- A. 3 a.m.
 - B. 7 a.m.
 - C. 9 a.m.
 - D. 3 p.m.
228. The greatest bacterial activity and the highest BOD₅ removal in a waste stabilization lagoon will occur when there is
- A. Good sunlight, cold temperature and strong wind.
 - B. Warm temperature, strong wind and heavily overcast.
 - C. Moderate breeze, cold temperature and good sunlight.
 - D. Warm temperature, moderate breeze and good sunlight.
229. Chlorine gas is
- A. Colorless.
 - B. Heavier than air.
 - C. Non-toxic.
 - D. Odorless.
230. Acids should never be added to chlorine solutions as they
- A. Cause chlorine gas to be released.
 - B. Corrode or "eat away" the solution tank.
 - C. Decrease the disinfecting properties of chlorine.
 - D. Result in the formation of a chloride precipitate.
231. As water temperatures decrease, the disinfecting action of chlorine
- A. Decreases.
 - B. Increases.
 - C. Remains the same.
232. The highest concentration of algae growth in a lagoon is usually observed
- A. Near mid-depth.
 - B. Near bottom.
 - C. Near top.
 - D. Below 10.0 feet.

233. Which of the following is not a possible cause of short-circuiting in a pond?
- A. Excessive weed growth.
 - B. High influent BOD.
 - C. Poor arrangement of inlet and outlet.
 - D. Irregular pond bottom.
234. Common settling times in wastewater treatment plants range from
- A. 15 to 30 minutes.
 - B. 30 to 45 minutes.
 - C. 1 to 2 hours.
 - D. 2 to 4 hours.
235. Which gas is produced in anaerobic digesters and can be used as a fuel?
- A. Propane.
 - B. Methane.
 - C. Ethane.
 - D. Carbon dioxide.
236. Compute the lagoon's detention time (days).
- DATA: Surface area = 6.0 acres.
Average depth = 3.0 feet.
Average evaporation exceeds precipitation by 0.4 in/day.
Average daily flow (influent) = 0.25 MGD.
1 acre (area) = 43,560 sq. ft.
1 cu. ft. contains 7.5 gal.
- A. 24.
 - B. 32.
 - C. 37.
 - D. None of the above.
237. How many pounds of chlorine gas is necessary to treat 4,000,000 gallons of wastewater at a dosage of 2 mg/L?
- A. 61 lbs.
 - B. 65 lbs.
 - C. 67 lbs.
 - D. 69 lbs.
238. Assume a community of 1,100 people has a lagoon. The flow averages 80,000 gallons per day. The flow is
- A. 14 gallons per capita.
 - B. 72 gallons per capita.
 - C. 80 gallons per capita.
 - D. 140 gallons per capita.
239. The rock in most trickling filters is placed
- A. Directly in the ground.
 - B. Directly in a concrete slab.
 - C. On a system of tile underdrains.
 - D. On a rubber tile floor.

240. Chlorine is used to
- Disinfect.
 - Prevent corrosion.
 - Raise the pH.
 - Stabilize organics.
241. What is the purpose of heating and mixing a primary anaerobic digester?
- To eliminate all oxygen present.
 - To increase the digestion rate.
 - To keep methane gas in suspension.
 - To prevent settling of grit to the bottom of the digester.
242. The following device is used to measure the flow of wastewater:
- Comminutor.
 - Comparator.
 - Parshall flume.
 - Sluice gate.
243. A spray nozzle on the mechanically cleaned screen has become plugged. To ensure your safety, prior to entering the screen housing to repair the nozzle, you should
- Leave note on breaker panel of repair being made.
 - Request assistance for repair.
 - Turn off and lock motor control.
 - Turn off local control switch.
244. Exhaust from a chlorinator room should be taken from
- Anywhere--the location is not important.
 - At floor level.
 - Close to the entrance.
 - In the ceiling.
245. Which of the following would be the safest action to take in the event of a major chlorine container leak?
- Call the fire department to hose down the container.
 - Notify local police or sheriff.
 - Roll the container so that liquid rather than gas escapes.
 - Submerge the container in a basin or stream if feasible.
246. A composite sample will give a(n)
- Even color.
 - High pH.
 - Instantaneous sample.
 - Representative sample.
247. Chlorine residual may be determined using the reagent
- Diethyl-p-phenylenediamine (DPD).
 - Ethylenediamine tetraacetic acid (EDTA).
 - Polychlorinated biphenyls (PCB).
 - Sodium thiosulfate ($\text{Na}_2 \text{S}_2 \text{O}_3$)

248. Results from the Multiple-Tube Fermentation Technique for members of the Total Coliform Group are expressed as

- A. DPD.
- B. MF.
- C. MGD.
- D. MPN.

250. Sources for more information and training courses are

- A. Federal, state and local water pollution control agencies.
- B. Libraries.
- C. Local and national water pollution control associations.
- D. All of the above.

WASTEWATER STUDY GUIDE

CLASS II

251. What test is not run on the influent?
- A. BOD.
 - B. Fecal coliform.
 - C. Suspended solids.
 - D. pH.
252. What disease is not considered to be normally conveyed or transmitted by untreated wastewater?
- A. Amoebic dysentery.
 - B. Hepatitis.
 - C. Malaria.
 - D. Chlorea.
253. Pathogens
- A. Are bacteria or virus that cause disease.
 - B. Are bacteria which do not occur in water.
 - C. Can obtain their food supply without help.
 - D. Are not harmful to man.
254. Improper handling, storing or preparing solutions of chemicals can cause
- A. Burns.
 - B. Explosions.
 - C. Loss of eye sight.
 - D. All of the above.
255. Considering the layout and flow diagram for the complete treatment plant, most oxidation ditch plants would be most similar to which of the following?
- A. Completely mixed activated sludge.
 - B. Contact stabilization.
 - C. Conventional activated sludge.
 - D. Plug flow aeration.
256. Over a four-year period, the hour meter on an instrument air compressor had the following readings at the end of each year: 1st year - 976.3; 2nd year - 1325.8; 3rd year - 2007.1; and 4th year - 2371.4. How many hours does the meter show the compressor ran during the third year?
- A. 349.5 hours.
 - B. 364.3 hours.
 - C. 681.3 hours.
 - D. 830.2 hours.

257. If a truck starting with a full gas tank is driven 115 miles and you fill the truck with gasoline on the following day and it requires 9.7 gallons to fill, how many miles per gallon did the truck average?
- A. 9.2 miles per gallon.
 - B. 11.8 miles per gallon.
 - C. 17.6 miles per gallon.
 - D. 20 miles per gallon.
258. An air-gap device is used to
- A. Increase oxygen content in manholes.
 - B. Prevent cross-connections.
 - C. Prevent excessive vibration in pipe joints.
 - D. Ventilate manholes.
259. A horizontal centrifugal pump has "rope" packing. When the pump is operating, water slowly drips from the packing gland. This indicates that the
- A. Packing bolts or nuts on the packing gland should be tightened.
 - B. Packing bolts or nuts on the packing gland should be loosened.
 - C. Packing bolts or nuts on the packing gland are properly adjusted.
 - D. Packing should be replaced.
260. Dresser and victaulic couplings are commonly used with what pipe materials?
- A. Asbestos cement.
 - B. Cast iron.
 - C. Concrete.
 - D. Plastic.
262. A single-piston reciprocating pump has a 6-inch diameter piston with a 6-inch length of stroke. If it makes 16 discharge strokes per minute, the pumping rate is _____ gallons per minute.
- A. 6.
 - B. 12.
 - C. 25.
 - D. 47.
263. A fire hydrant should be closed slowly to avoid
- A. Excessive head loss.
 - B. Excessive wear.
 - C. Injury to operator.
 - D. Water hammer.

264. In electrical circuits a(n) _____ is used to reduce the voltage where necessary.
- A. Ammeter.
 - B. Thermal overload.
 - C. Transformer.
 - D. Voltmeter.
265. Wear rings are installed in a pump to
- A. Hold the shaft in position.
 - B. Keep the impeller in place.
 - C. Concentrate wear on an economically replaceable part.
 - D. Wear out rings instead of sleeves.
266. Globe valves are used for all of the following purposes, except
- A. Air-vacuum control.
 - B. Flow regulation.
 - C. Pressure regulation.
 - D. Pump control.
267. A positive displacement sludge pump should never be placed into operation
- A. Without being primed.
 - B. With the discharge valve closed.
 - C. With the discharge valve opened.
 - D. None of the above.
268. Closing a valve too quickly causes
- A. A surge in the line.
 - B. No problems in the piping.
 - C. Pipe fittings to become more secure.
 - D. The wastewater to go septic.
269. What effect will the addition of chlorine, acid, alum, carbon dioxide or sulfuric acid have on the pH of wastewater?
- A. Neutralize.
 - B. Lower.
 - C. Increase.
 - D. Have no effect.
270. Given the data below, what is the most likely cause of the extended aeration facility problem?
- DATA: DO in aerator high.
Sludge blanket in clarifier high.
Return sludge flow low.
Air control valve open.
Blower normal.
- A. Adjustable slot plate elevation too low.
 - B. Return sludge air lift clogged.
 - C. Scum ejector clogged.
 - D. Sludge collector shear pin broken.

271. In which of the following types of wastewater would settling occur most rapidly?
- A. Cold wastewater.
 - B. Old (stale) wastewater.
 - C. Septic wastewater.
 - D. Strong wastewater.
272. Settled activated sludge is generally _____ than raw sludge.
- A. Thinner.
 - B. Thicker.
 - C. Saltier.
 - D. Denser.
273. Which of the following operational controls are used in the activated sludge process?
- A. Aeration, wasting, recirculation.
 - B. Loading rate, solids concentration, DO.
 - C. Recycling rate, blower speed, sludge age.
 - D. Sludge blanket depth, settleability, floc size.
274. Which of the following is not biologically active in a lagoon?
- A. Aerobic bacteria.
 - B. Anaerobic bacteria.
 - C. Algae.
 - D. Fungi.
275. Under ice and snow cover, the BOD level in the ponds will normally
- A. Decrease rapidly.
 - B. Decrease slowly.
 - C. Increase slowly.
 - D. Remain the same.
276. An amperometric titrator is used to measure
- A. Alkalinity.
 - B. Chlorine residual.
 - C. Conductivity.
 - D. COD.
277. The rotational speed of the air driven rotating biological contractor (RBC) is controlled by
- A. Air pressure.
 - B. Air velocity.
 - C. Air volume.
 - D. Diffuser head setting.
278. Chloramines are
- A. Combined chlorine.
 - B. Enzymes.
 - C. Found in polluted air.
 - D. Free chlorine.

279. Which one of the following conditions increases chlorine demand?
- A. Alkalinity increasing.
 - B. Increase in organic matter.
 - C. Increase in phosphate concentration.
 - D. pH increase.
280. The purpose of adding sodium thiosulfate to a microbiological sample bottle is to
- A. Extend the allowable holding time from 6 to 30 hours.
 - B. React with nitrates that interfere with the MPN test.
 - C. Remove any chlorine residual present.
 - D. To ensure sterilization of sample bottle.
281. Which one of the following are normal conditions for a manual control gas chlorination system?
- A. Lines free of ice.
 - B. Pressure reading slowly decreasing.
 - C. Rotometer float fluctuating over a range of ten pounds per 24 hours.
 - D. Vacuum gauge fluctuating over a range of 10" Hg.
282. Calculate the weir loading for a sedimentation tank that has an outlet weir 480 ft. long and a flow of 5 MGD.
- A. 9220 gpd/ft.
 - B. 9600 gpd/ft.
 - C. 9920 gpd/ft.
 - D. 10,420 gpd/ft.
283. A settling basin has a length of 60 ft., width of 20 ft., and depth of 12 ft. At a flow rate of 60 mgd, what is the retention time of this basin?
- A. 15 minutes.
 - B. 30 minutes.
 - C. 1.1 hours.
 - D. 2.3 hours.
284. Calculate the pounds of BOD per day entering the trickling filter.
- DATA: Raw wastewater flow is 1.5 MGD.
Raw wastewater BOD is 150 mg/L.
There is a 30% reduction in BOD across the primary clarifiers.
- A. 560 lbs/day.
 - B. 870 lbs/day.
 - C. 880 lbs/day.
 - D. 1600 lbs/day.

285. Calculate the volume of sludge in the clarifier.

DATA: Clarifier volume = 700,000 gallons.
Aeration tank conc. = 3% solids.
Return sludge conc. = 12% solids.
Depth of sludge blanket = 8 ft.
Average clarifier depth = 10 ft.
Concentrations determined by centrifuge method, not by gravimetric means.

- A. 0.14.
- B. 0.20.
- C. 0.92.
- D. 1.26.

286. How many pounds of chlorine will be used in one day if the flow is 700,000 gpd and a uniform dose of 1.2 mg/L is applied?

- A. 7 lbs.
- B. 15 lbs.
- C. 22 lbs.
- D. 26 lbs.

287. The main action of a mixed media filter is

- A. Straining.
- B. Disinfecting.
- C. Coagulation.
- D. None of the above.

288. Chlorine cylinders may be lifted using

- A. Cables.
- B. Chains.
- C. Clamps.
- D. Ropes.

289. A chlorine leak can be detected by

- A. An explosimeter.
- B. Checking the leak gauge.
- C. Green or reddish deposits on metal.
- D. Spraying water on suspected leaks.

290. Failure of the chlorine solution pumps would result in

- A. A decrease in digester gas production.
- B. An increase in digester gas production.
- C. Lower effluent fecal coliform count.
- D. None of the above.

292. Not supplying enough air will cause
- A. Effluent quantity to improve.
 - B. Excessive turbulence to occur on aeration compartment surface.
 - C. Slick spots to show up on aeration compartment walkway.
 - D. Turbidity of final effluent to increase.
293. Given the data below, what is the most likely cause of the extended aeration facility problem?
- DATA: DO level high.
Blower normal.
Wastewater characteristics normal.
Drop pipe air control valves open.
Surface turbulence high.
- A. Air relief valve stuck shut.
 - B. Blower speed too fast.
 - C. Blower speed too slow.
 - D. Drop pipe air control valves not open far enough.
294. If the sludge depth in a secondary sedimentation tank is too high, what will happen?
- A. Decreased turbidity in effluent.
 - B. Return activated sludge will have lower oxygen demand.
 - C. Settleable solids from aeration tank will increase.
 - D. Sludge may become septic.
295. What might cause a white filamentous growth in an RBC system which will result in poor BOD removal efficiency?
- A. High pH in the wastewater.
 - B. Low BOD loading.
 - C. Low pH in the wastewater.
 - D. Septic wastewater.
296. Pump station maintenance reports should include
- A. Additional maintenance scheduling required.
 - B. How repairs were made.
 - C. Special equipment required.
 - D. All of the above.
297. Disaster planning is
- A. Having manuals ready so they can be read if a disaster occurs.
 - B. Something that, if properly done, will not need to be revised.
 - C. Useful in reducing confusion in the event of a disaster.
 - D. None of the above.
298. Every day the operator of a small wastewater treatment plant should
- A. Clean settling basins and dispose of sludge.
 - B. Determine that all plant equipment is operational.
 - C. Replenish chemical stock.
 - D. Test start standby pumps, motors and generators.

299. There are generally more limitations on authority the farther one _____ in the organization.
- A. Ascends
 - B. Descends
 - C. Moves horizontally
 - D. Remains
300. When an employee breaks the rules and requires discipline, who is responsible for administering it?
- A. Fellow employees.
 - B. Personnel office.
 - C. Supervisor.
 - D. Upper management.

<u>Item #</u>	<u>Answer</u>	<u>Subject</u>
201	B	General
202	D	General
203	C	General
204	C	General
205	C	General
206	A	General
207	D	General
208	A	General
209	B	General
210	C	General
211	D	Support Systems
212	B	Support Systems
213	B	Support Systems
214	B	Support Systems
215	B	Support Systems
216	B	Support Systems
217	A	Support Systems
218	D	Support Systems
219	A	Support Systems
220	D	Support Systems
221	A	Support Systems
222	D	Support Systems
223	B	Support Systems
224	B	Unit Process/Process Control
225	A	Unit Process/Process Control
226	A	Unit Process/Process Control
227	D	Unit Process/Process Control
228	D	Unit Process/Process Control
229	B	Unit Process/Process Control
230	A	Unit Process/Process Control
231	A	Unit Process/Process Control
232	C	Unit Process/Process Control
233	B	Unit Process/Process Control
234	D	Unit Process/Process Control
235	B	Unit Process/Process Control
236	B	Unit Process/Process Control
237	C	Unit Process/Process Control
238	B	Unit Process/Process Control
239	C	Unit Process/Process Control
240	A	Unit Process/Process Control
241	B	Unit Process/Process Control
242	C	Unit Process/Process Control
243	C	Unit Process/Process Control
244	B	Unit Process/Process Control
245	B	Unit Process/Process Control
246	D	Unit Process/Process Control
247	A	Unit Process/Process Control
248	D	Unit Process/Process Control
250	D	Tech. Supervision/Mgt.

<u>Item #</u>	<u>Answers</u>	<u>Subject</u>
251	B	General
252	C	General
253	A	General
254	D	General
255	A	General
256	C	General
257	B	General
258	B	General
259	C	Support Systems
260	B	Support Systems
262	B	Support Systems
263	D	Support Systems
264	C	Support Systems
265	C	Support Systems
266	A	Support Systems
267	B	Support Systems
268	A	Support Systems
269	B	Unit Process/Process Control
270	B	Unit Process/Process Control
271	A	Unit Process/Process Control
272	A	Unit Process/Process Control
273	B	Unit Process/Process Control
274	D	Unit Process/Process Control
275	C	Unit Process/Process Control
276	B	Unit Process/Process Control
277	C	Unit Process/Process Control
278	A	Unit Process/Process Control
279	B	Unit Process/Process Control
280	C	Unit Process/Process Control
281	A	Unit Process Process Control
282	D	Unit Process/Process Control
283	C	Unit Process/Process Control
284	D	Unit Process/Process Control
285	A	Unit Process/Process Control
286	A	Unit Process/Process Control
287	A	Unit Process/Process Control
288	C	Unit Process/Process Control
289	C	Unit Process/Process Control
290	D	Unit Process/Process Control
292	D	Unit Process/Process Control
293	B	Unit Process/Process Control
294	D	Unit Process/Process Control
295	D	Unit Process/Process Control
296	D	Tech. Supervision/Mgt.
297	B	Tech. Supervision/Mgt.
298	B	Tech. Supervision/Mgt.
299	B	Tech. Supervision/Mgt.
300	C	Tech. Supervision/Mgt.