

# Distribution Class III



1. Which one of the following types of pumps works on the basis of inertia or mass moving in a circular motion?
  - a. air lift
  - b. centrifugal
  - c. diaphragm
  - d. gear

2. The annual operating cost is
  - Salaries = \$5970
  - Chemicals = \$2540
  - Power = \$3251
  - Miscellaneous = \$269

What is the cost per 1000 gal if 2 mil gal of water are pumped each month?

- a. \$6.02
  - b. \$2.99
  - c. \$0.50
  - d. cannot be determined
3. The coupon test can be used
  - a. to determine water quality.
  - b. to calculate the influence of daily treatment changes.
  - c. as an indication of the corrosion/scaling rate.
  - d. none of the above.
4. Red water is experienced in one water main while no problem exists in nearby mains in the system. Laboratory tests show that the water is not corrosive. You should check
  - a. temperature in all piping.
  - b. piping for excessive scale buildup.
  - c. head loss.
  - d. for bacteria.

5. Pipe specimens taken from tapping operations can be used
  - a. as paperweights.
  - b. for chemical testing.
  - c. to design pipe thickness.
  - d. to indicate the condition of the distribution system.
  
6. A double check-valve assembly
  - a. can be constructed from two reliable check valves.
  - b. has the relief port blocked off.
  - c. is less susceptible to vandalism.
  - d. is not recommended where a health hazard would result from its failure.
  
7. The effect of partially closing the discharge valve on a three-phase, induction motor-driven, centrifugal pump would be to
  - a. cause the motor to draw less amperage.
  - b. cause the motor to run hotter.
  - c. cause the motor to run slower.
  - d. cause the pumped wastewater to get colder.
  
8. Polyphosphates are used to
  - a. control algae.
  - b. improve taste.
  - c. keep iron and manganese in solution.
  - d. kill bacteria.
  
9. Which of the following types of pumps works on the principle of a decrease in the overall specific weight of a confined column of a gas-water mixture?
  - a. air lift
  - b. centrifugal
  - c. diaphragm
  - d. piston
  
10. When the impeller in a centrifugal pump becomes worn after use, the amount of energy used will be \_\_\_\_\_ the amount used by a similar, new pump.
  - a. erratic, sometimes more than and sometimes less than
  - b. less than
  - c. more than
  - d. the same as

11. Pneumatic ejectors are not recommended when flow exceeds \_\_\_\_\_ gpm.
- 10
  - 100
  - 500
  - 1000
12. Corrosion may be observed in a distribution system as
- an electric shock.
  - a red-water problem.
  - causing an increase in water velocity.
  - causing dirt or nuisance organisms.
13. Hydrogen sulfide in well water will cause the water to have an odor similar to
- ammonia.
  - chlorine gas.
  - rotten eggs.
  - fish eggs.
14. A major cause of pump and motor shaft coupling wear is
- a discharge pressure too high.
  - misalignment.
  - a worn out seal.
  - none of the above.
15. In most cases, minor leakage around joints during an initial test of a hydrant
- can be ignored.
  - can be stopped by tightening bolts and caulking threads.
  - is cause for rejection of the hydrant.
  - will stop as the gasket material swells with water.
16. Concrete thrust blocks are used to keep
- the pipe level.
  - the pipe from floating.
  - joints from opening.
  - all of the above.
17. For small service connections to a thin or soft main, it is best to use a
- copper corporation stop instead of the harder brass.
  - dry tap, to avoid splitting the main.
  - service clamp or saddle.
  - tee fitting.

18. The overflow pipe on an elevated balancing water tank should be of sufficient diameter to permit wastage of water
  - a. at half the filling rate.
  - b. at the normal filling rate.
  - c. in excess of the filling rate.
  - d. none of the above.
  
19. Insurance Services Office requires a minimum residual gauge pressure (during hydrant flows in the vicinity) of \_\_\_\_\_ psi.
  - a. 10
  - b. 20
  - c. 30
  - d. 40
  
20. In deciding which premises to inspect first for a cross connection, the primary consideration is
  - a. convenience of the owner.
  - b. degree of hazard.
  - c. geographic hazard.
  - d. which locations are upstream (in relation to the potable lines) of residences.
  
21. The type of corrosion caused by the use of dissimilar metals in water systems is known as \_\_\_\_\_ corrosion.
  - a. caustic
  - b. galvanic
  - c. oxygen
  - d. tubercular
  
22. The first step in establishing a cross-connection control program is
  - a. educating the public and municipal government.
  - b. inspecting premises.
  - c. passing the authorizing control ordinance.
  - d. planning.
  
23. Dry-barrel hydrant drains
  - a. may leak for up to 30 days after installation, at which time they should be retested.
  - b. should be plugged in areas of high groundwater.
  - c. should be plugged as soon as testing is complete.
  - d. should be watertight to avoid cross connections.

24. Suppose the chlorine demand of a water is 4 mg/L and a 0.1-mg/L chlorine residual is desired. How many pounds of chlorine will be required for a flow of 1.2 mgd in 24 h?
- 20 lb
  - 39 lb
  - 41 lb
  - 62 lb
25. If the horizontal scale on a plan is 1 in. = 100 ft, and the vertical scale is 1 in. = 10 ft, how long a line would represent a level length of pipeline 175-ft long?
- 0.175 in.
  - 1.75 in.
  - 17.5 in.
  - 175 in.
26. Loss of pipe carrying capacity is a good indication of
- pumping problems.
  - leaks due to corrosion.
  - improper sizing of transmission lines.
  - excessive tuberculation or scale buildup.
27. What is the main reason to contact other companies with underground utilities in the area before starting an underground repair job?
- Determine how long its been since they dug up the street.
  - Have these companies mark the location of their utilities in the area of the repair job.
  - See if they have some excavating to do in the area too.
  - See if they want to help route traffic while you are doing the repair job.
28. A nutating disc is found in certain
- centrifugal pumps.
  - gate valves.
  - water meters.
  - none of the above.
29. A meter in a well discharge line reads 0005678 gal on one Monday and 0356098 gal on the following Monday. What is the average daily pumpage?
- 35,042 gpd
  - 43,802 gpd
  - 50,060 gpd
  - 350,420 gpd

30. The basic pipeline size used in a water distribution system is determined by
- customer need.
  - desired pressure.
  - elevation and friction losses.
  - fire protection needs.
31. A pump operating at the rated discharge of 120 gpm will fill a 3600-gal tank truck in \_\_\_\_\_ min.
- 15
  - 30
  - 45
  - 60
32. A flow of 650 gpm is \_\_\_\_\_ mgd?
- 0.472
  - 0.936
  - 1.714
  - 1.923
33. When compared to a 1-mil gal reservoir at the same water elevation, how much pressure in the mains will a 100,000-gal reservoir develop?
- exactly one-tenth as much pressure
  - less pressure
  - more pressure
  - the same pressure
34. Hydrant barrels should be painted
- in a bright color.
  - in a dark color to help prevent freezing.
  - in the official utility or city color.
  - with a code to indicate flow capacity or main size.
35. If static pressure in a water system is too high, the remedy is to
- install a booster pump.
  - install pressure-reducing valves.
  - throttle the suction valve on the well pump.
  - none of the above.
36. Uncontrolled scale deposits can reduce
- the potential for waterborne-disease outbreaks.
  - the carrying capacity of the distribution system.
  - interference with disinfection practices.
  - changes in pressure and velocity.

37. When first hired, many employees will learn standard utility procedures by
- attending new-employee orientation.
  - attending staff meetings.
  - reading the standard operating practice (SOP) manual.
  - talking with the customer service representative.
38. A chlorine residual of 0.2 mg/L means the amount present is
- 0.2 gal of chlorine in 1 mil lb of water.
  - 0.2 kg of chlorine in 1 mil m<sup>3</sup> of water.
  - 0.2 lb of chlorine in 1 mil gal of water.
  - 0.2 lb of chlorine in 1 mil lb of water.
39. What is the detention time in a storage tank 20-ft high and 30 ft in diameter, when the rate of flow is 500,000 gpd?
- 2 h 10 min
  - 3 h 48 min
  - 4 h 27 min
  - 5 h 4 min
40. If a fuse continues to blow, you should
- inspect the affected equipment to determine the cause.
  - provide a jumper in the box.
  - replace it with a fuse of lower capacity.
  - replace it with a higher capacity fuse.
41. Wearing rings are installed in a pump to
- hold the shaft in position.
  - keep the impeller in place.
  - prevent pump internal recirculation.
  - wear out rings instead of sleeves.
42. Given the chlorine residual maintained in water systems today, disease outbreaks from cross connections
- are possible only with very hardy pathogens.
  - are still a major threat to public health.
  - are unlikely.
  - may occur from virus, but not from bacterial pathogens.
43. A meter that measures water in a side loop off the main is called a \_\_\_\_\_ meter.
- side-loop
  - proportional
  - low-loss
  - displacement

44. "Cathodic protection" means protection against
- contamination.
  - corrosion.
  - hardness.
  - infiltration.
45. Meter and service records are usually kept
- in books or on computer.
  - in books or on maps.
  - on cards or computer.
  - on tags attached to the customer meter.
46. How many gal of water would 600 ft of 6-in. pipe hold, approximately?
- 740 gal
  - 880 gal
  - 900 gal
  - 930 gal
47. How many workers would be assigned to open a hydrant's main valve?
- Two, using the standard 24-in. (600-mm) two-person wrench.
  - Two, the operator and a second person to stand by in case of emergency.
  - One, if power valve operators are available.
  - One, using no more than a 15-in. (380-mm) wrench.
48. A corporation stop thread is used to
- connect galvanized steel pipe.
  - connect plastic pipe.
  - connect to the water meter.
  - "hot tap" a service into a line.
49. During inspection of a dry-barrel hydrant, the drains (if open) should be flushed for about 10 s by
- creating a negative pressure in the hydrant with a portable vacuum pump.
  - cycling the main valve with the auxiliary valve closed.
  - opening the main valve part way with the nozzle caps on.
  - pressurizing the hydrant with a portable pump.
50. What is the head on a system exerting a static pressure of 62 psi?
- 89 ft
  - 107 ft
  - 143 ft
  - 175 ft



51. You have a new gasoline-powered diaphragm-type portable pump. You are using heavy-duty spiral-wire reinforced suction hose. The practical maximum height at which to set the pump above water level is
- 2 to 6 ft. If you try to pump with more than 6 ft of suction lift, the plies of the pump diaphragm will rupture.
  - 20 to 25 ft. This is approaching the value of barometric pressure.
  - 40 ft. OSHA regulations limit net suction lift to 50 ft or less for gasoline-powered portable pumps.
  - 75 ft. The suction hose would collapse with more than 75 ft of negative water column.
52. The *C* factor of a water pipe is the measurement of the
- area to pipe diameter.
  - cost to diameter ratio.
  - pipe diameter to area.
  - interior roughness.
53. The pressure vacuum breaker can remain under supply pressure for long periods because it
- is made of reinforced steel.
  - has test cocks and is maintained regularly.
  - has a spring-operated check valve.
  - has a gravity-operated relief valve.
54. Vibrations in pumps may be caused by improper motor-pump
- alignment.
  - curves.
  - pipng.
  - power factor.
55. How many milligrams per litre would you have if 200 lb of chlorine are added to 2 mil gal?
- 10 mg/L
  - 12 mg/L
  - 14 mg/L
  - 16 mg/L
56. Centrifugal pump noises will most likely be due to
- cavitation.
  - excessive head pressure.
  - high velocity.
  - sand.

57. A pressure gauge on the discharge side of a pump reads 120 psi. How many feet of water is this pressure equivalent to?
- 64 ft
  - 231 ft
  - 277 ft
  - 444 ft
58. A common way to use distribution water storage is to fill storage
- at night, then use stored water in the daytime.
  - during low-demand hours, then use water from storage during high-demand hours.
  - during low-demand winter days, then use stored water during high-demand summer days.
  - while filters are operating, then use storage during filter backwash.
59. A 40-hp motor runs an average of 16 h/d. What will the monthly power cost be if the motor is 80 percent efficient and electricity costs \$0.02/kW-h? Assume 1 month equals 30 days.
- \$537.00
  - \$573.00
  - \$859.00
  - \$965.00
60. The primary reason for a dry-barrel fire hydrant is to
- allow easy maintenance of the hydrant.
  - prevent water hammer.
  - keep the hydrant from freezing.
  - keep the barrel from rusting.
61. A portion of cast-iron pipe after five years of use shows a white-colored scale  $\frac{1}{2}$ -in. thick on the inside pipe walls. This means that
- the water has been corrosive.
  - the water is chemically unstable and is depositing calcium carbonate.
  - the *C* factor should increase due to the lining effect.
  - red water will soon become a problem.
62. A particular electric motor is wound for three-phase current. If one phase cuts out while it is in operation, the motor will
- continue to run without danger and will do a normal amount of work.
  - continue to run without danger, but the work done will be reduced one third.
  - heat and will be damaged unless it is stopped by a thermal control device.
  - stop immediately.

63. A well is pumping into a reservoir at 300 gpm while the service pumps are pumping from the reservoir at 400 gpm. Which direction is the reservoir water level going?
- down
  - stationary
  - up
  - cannot tell from the information
64. How many pounds of HTH (65 percent available chlorine) will be required to disinfect a reservoir with a capacity of 850,000 gal if the desired chlorine dosage is 10 mg/L?
- 110 lb
  - 459 lb
  - 982 lb
  - 1193 lb
65. Two pumps of the same size coupled end-to-end would
- cause heating of the pumps.
  - double both flow and head.
  - double the flow.
  - double the head.
66. Your chlorinator breaks down and you decide to feed a sodium hypochlorite solution containing 15 percent chlorine as a temporary measure. Six milligrams per litre of chlorine are required for 1.8 mil gal pumped in 18 h. How many gallons per hour of the hypochlorite solution will be required? Assume specific gravity to be 1.0.
- 2.67 gph
  - 3.00 gph
  - 4.00 gph
  - 5.00 gph
67. What type of treatment should be given when a well produces red water?
- pH adjustment, aeration, and filtration
  - sedimentation
  - softening
  - taste and odor control
68. Leakage from a packing gland should be approximately
- none.
  - 10 drops per second.
  - 10 drops per minute.
  - 30 drops per hour.





# ANSWERS

## Distribution Class III

- |       |       |       |
|-------|-------|-------|
| 1. b  | 19. b | 37. a |
| 2. c  | 20. b | 38. d |
| 3. c  | 21. b | 39. d |
| 4. d  | 22. d | 40. a |
| 5. d  | 23. b | 41. d |
| 6. d  | 24. c | 42. b |
| 7. b  | 25. b | 43. b |
| 8. c  | 26. d | 44. b |
| 9. a  | 27. b | 45. c |
| 10. c | 28. c | 46. b |
| 11. b | 29. c | 47. d |
| 12. b | 30. d | 48. d |
| 13. c | 31. b | 49. c |
| 14. b | 32. b | 50. c |
| 15. b | 33. d | 51. b |
| 16. c | 34. a | 52. d |
| 17. c | 35. b | 53. c |
| 18. c | 36. b | 54. a |

- 55. b
- 56. a
- 57. c
- 58. b
- 59. a

- 60. c
- 61. b
- 62. c
- 63. a
- 64. a

- 65. d
- 66. c
- 67. a
- 68. c

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