

Registration form

**DISTRIBUTION CERTIFICATION PREPARATION  
TRAINING COURSE \$100.00  
48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL \$50.00**

**Start and finish dates:** \_\_\_\_\_

*You will have 90 days from this date in order to complete this course*

**List number of hours worked on assignment must match State Requirement.** \_\_\_\_\_

**Name** \_\_\_\_\_ **Signature** \_\_\_\_\_

*I have read and understood the disclaimer notice on page 2. Digitally sign XXX*

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**Home (\_\_\_\_)** \_\_\_\_\_ **Work (\_\_\_\_)** \_\_\_\_\_

**Operator ID #** \_\_\_\_\_ **Exp. Date** \_\_\_\_\_

**Please circle/check which certification you are applying the course CEU's/PDH's.**

Water Treatment \_\_\_\_\_ Distribution \_\_\_\_\_ Groundwater \_\_\_\_\_

Well Drillers \_\_\_\_\_ Pump Installer \_\_\_\_\_ Other \_\_\_\_\_

***Your certificate will be mailed to you in about two weeks.***

**Technical Learning College TLC PO Box 3060, Chino Valley, AZ 86323**

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## **DISCLAIMER NOTICE**

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**State Approval Listing Link**, check to see if your State accepts or has pre-approved this course. Not all States are listed. Not all courses are listed. If the course is not accepted for CEU credit, we will give you the course free if you ask your State to accept it for credit.

**Professional Engineers**; Most states will accept our courses for credit but we do not officially list the States or Agencies. Please check your State for approval.

## **State Approval Listing URL...**

<http://www.tlch2o.com/PDF/CEU%20State%20Approvals.pdf>

*You can obtain a printed version of the course manual from TLC for an additional \$69.95 plus shipping charges.*

## **AFFIDAVIT OF EXAM COMPLETION**

I affirm that I personally completed the entire text of the course. I also affirm that I completed the exam without assistance from any outside source. I understand that it is my responsibility to file or maintain my certificate of completion as required by the state or by the designation organization.

## **Grading Information**

In order to maintain the integrity of our courses we do not distribute test scores, percentages or questions missed. Our exams are based upon pass/fail criteria with the benchmark for successful completion set at 70%. Once you pass the exam, your record will reflect a successful completion and a certificate will be issued to you.

For security purposes, please fax or e-mail a copy of your driver's license and always call us to confirm we've received your assignment and to confirm your identity.

Thank you...

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## Distribution Prep Answer Key

Name \_\_\_\_\_

Phone \_\_\_\_\_

***You are solely responsible in ensuring that this course is accepted for credit by your State. Did you check with your State agency to ensure this course is accepted for credit?***

***Method of Course acceptance confirmation. Please fill this section***

Website \_\_\_ Telephone Call \_\_\_ Email \_\_\_ Spoke to \_\_\_\_\_

Did you receive the approval number if Applicable? \_\_\_\_\_

What is the approval number if Applicable? \_\_\_\_\_

***You are responsible to ensure that TLC receives the Assignment and Registration Key. Please call us to ensure that we received it.***

***You can use Adobe Acrobat DC Program to complete the assignment.***

***Please circle, underline, bold or X only one correct answer***

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**Please fax the answer key to TLC Western Campus Fax (928) 272-0747.  
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**Distribution Certification Preparation CEU Training Course  
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## Distribution Certification Preparation CEU Training Course Assignment

*The Assignment (Exam) is also available in Word on the Internet for your Convenience, please visit [www.ABCTLIC.com](http://www.ABCTLIC.com) and download the assignment and e- mail it back to TLC.*

You'll have 90 days from the start of this course to complete in order to receive your Professional Development Hours (**PDHs**) or Continuing Education Unit (**CEU**). A score of 70 % is necessary to pass this course. We prefer if this exam is proctored. No intentional trick questions.

We would prefer that you utilize the enclosed answer sheet in the front, but if you are unable to do so, type out your own answer key. Please include your name and address on your manual and make copy for yourself. **(S) Means answer may be plural or singular. Multiple Choice Section, One answer per question and please use the answer key.**

1. When a valve position is changed quickly, the water pressure in a pipe will increase and decrease back and forth very quickly. This rise and fall in pressure can cause serious damage to the system. This occurrence is commonly referred to as? SAC. Sec. 3.1

- A. Surge Chamber
- B. Water Hammer
- C. Backflow
- D. Backsiphonage
- E. None of the Above

2. Liquid chlorine or gas, calcium hypochlorite and - this missing term - are commonly used as disinfectants. There are several methods which can be used to disinfect a water storage facility. SAC. Sec. 2.43

- A. Sodium Hypochlorite
- B. Sodium Dioxide
- C. Sulfur Dioxide
- D. Sodium Thiosulfate
- E. None of the Above

3. While water sampling, you have a **POSITIVE BACTERIOLOGICAL SAMPLE**, this means that there is? SAC. Sec. 2.34

- A. Absence of bacteriological contamination
- B. Presence of bacteriological contamination
- C. Presence of nitrates
- D. Chloroform
- E. None of the Above

4. Small water storage tanks are commonly disinfected with a chlorine dosage of 50 mg/L. After 24 hours, you would want a chlorine residual of at least? SAC. Sec. 2.43 Topic GK

- A. 5 mg/L
- B. 50 mg/L
- C. 1 mg/L
- D. 2 mg/L
- E. 10 mg/L

5. There is a special type of check valve located at the bottom end of the suction of a pipe. This valve opens when the pump operates to allow water to enter the suction pipe but closes when the pump shuts off to prevent water from flowing out of the suction pipe.

SAC. Sec. 2.33

- A. Foot Valve
- B. Prime Valve
- C. Backflow Valve
- D. Ball Valve
- E. Differential Valve

6. When a pump receives a signal to start, a light will typically be illuminated on the control panel indicating that the pump is running. In order to be sure that the pump is actually pumping water, - this missing term - should be installed on the control panel. SAC. Sec. 2.32

- A. Positive flow report-back signal
- B. SCATA
- C. Bell
- D. Weir
- E. None of the Above

7. Which of the following terms -joints are not generally used for field joints on large diameter steel pipe because of their high cost and lack of flexibility. They are advantageous, however, for special conditions such as connections to flanged gate valves, bridge crossings, meters, and for field connections by unskilled labor. SAC. Sec. 3.631

- A. Flanged
- B. Welded
- C. VC
- D. Bell
- E. None of the Above

8. This type of valve is used in the water distribution system to isolate sections of mains to permit the making of emergency repairs to be made without interruption of service to a large number of customers. SAC. Sec. 3.67

- A. Ball
- B. Butterfly
- C. Gate
- D. Plug
- E. None of the above

9. Which of the following terms allow large quantities of air to escape while filling a pipeline, permit air to enter a pipeline that is being drained, and allow entrained air to escape while a line is operating under pressure. SAC. Sec. 3.67

- A. Air relief valves
- B. Double check
- C. RP
- D. Vacuum Breaker
- E. None of the Above

10. Which of the following is a correct statement? SAC. Sec. 3.7
- A. Compound meters are not advantageous for places where there are predominantly low or intermediate flows, only occasionally, high flows.
  - B. The two major types of electronic flowmeters include the infrared, and ultrasonic.
  - C. Proportional meters are used to measure flows in lines.
  - D. None of the Above
11. What term is used to describe the gradual deterioration or destruction of a substance or material by chemical action proceeding inward from the surface. SAC. Sec. 4.501
- A. Electrochemical detonation
  - B. Backflow
  - C. Corrosion
  - D. Entrainment
  - E. None of the above
12. The length of a box is two feet, the width is 15 inches, and the height is 18 inches. Find its volume. SAC. Sec A.30
- A. 375 Cu. Ft.
  - B. 1.25 Cu. Ft.
  - C. 2 Cu. Ft.
  - D. 3.75 Cu. Ft
  - E. None of the Above
13. An 18-inch water main is to be flushed at a velocity of 4 ft/sec. What should the reading on the flowmeter be in gallons per minute? SAC. Sec A.133 example 14
- A. 1.77 Sq. Ft
  - B. 7.1 CFS
  - C. 3,000 GPM
  - D. 3,186 GPM
  - E. None of the Above
14. Convert 20 degrees Celsius to Fahrenheit? SAC. Sec. A.43
- A. 68
  - B. 36
  - C. 32
  - D. 57
  - E. E. None of the Above
15. A pressure gauge at a fire hydrant reads 50 psi. What is the head on the gauge at the fire hydrant in feet? SAC. Sec. A.132 Example 5
- A. 23.1 ft
  - B. 86 ft
  - C. 115.5 ft
  - D. 21.6 ft
  - E. None of the Above

16. The net weight of a tank of water is 750 lbs. How many gallons does it contain?  
SAC. Sec. A.5
- A. 60 Gallons
  - B. 120 Gallons
  - C. 150 Gallons
  - D. 90 Gallons
  - E. None of the Above
17. A rectangular channel 3 feet wide contains water 2 feet deep and flowing at a velocity of 1.5 feet per second. What is the flow rate in CFS? SAC. Sec. A.71
- A. 9
  - B. 1.5
  - C. 3.2
  - D. None of the above
18. What is a vortex? SAC. Sec. 4.624
- A. A whirlpool of revolving water
  - B. A weir
  - C. SCATA electrical term
  - D. Dual telemetering
  - E. None of the Above
19. What is used to measure or determine the corrosiveness of a water source?  
SAC. Sec. 5.12
- A. Marble and Langelier tests
  - B. Ferric, and Calcium Carbonate
  - C. A Lantern ring
  - D. Water's pH, Alkalinity and DO
  - E. All of the above
20. Breakpoint Chlorination is best described as? SAC. Sec. 6.25
- A. Chlorine is added until the desired free chlorine residual is achieved.
  - B. Chlorine is added until all microorganisms are killed.
  - C. Chlorine is added until all organic material is destroyed.
  - D. Chlorine is added until chloramines are formed.
  - E. None of the Above
21. Before digging and tapping a main for a new service connection, the operator should?  
SAC. Sec. 3.650
- A. Notify ADOT
  - B. Notify OSHA.
  - C. Locate all the valves on the quarter section
  - D. Determine the location of the other buried utilities, Bluestake or One-Call centers.
  - E. None of the Above
22. An Ion is best described as? SAC. Sec. 2.42
- A. An electrically charged atom
  - B. A very small atom ant
  - C. Atomically charged particles
  - D. A halogen atom
  - E. All of the above

23. Which of the following best describes the effect of temperature on chlorine disinfection effectiveness? SAC. Sec. 6.11
- A. Low temperatures decrease the effect of chlorine disinfection.
  - B. High temperatures increase the effect of chlorine disinfection.
  - C. Temperature has no effect on chlorine.
  - D. None of the above
24. Hearing protection is sometimes necessary when working around machinery. What is the unit of measurement for noise level? SAC. Table 7.7
- A. Decibels
  - B. Loudness
  - C. Decimals
  - D. Centimeters
  - E. None of the Above
25. Which of the following organisms or diseases is **NOT** transmitted by water? SAC. Table 6.1
- A. Dysentery
  - B. AIDS
  - C. Hepatitis
  - D. Cholera
  - E. None of the Above
26. Chlorine gas is easily detected because of the smell. What effect does chlorine gas have on the sense of smell? SAC. Sec. 6.60
- A. Increases smelling ability
  - B. Olfactory fatigue
  - C. Creates a taste of hydrogen sulfide
  - D. None of the above
27. Which of the following terms -is described as the vertical distance equal to the pressure at a specific point in a hydraulic system. SAC. Sec. 3.1
- A. Pressure Head
  - B. Pressure Velocity
  - C. Backpressure
  - D. Backsiphonage
  - E. None of the Above
28. Safe practices around wells should include? SAC. Sec. 7.33
- A. Applying disinfectant in or around a well casing during cleaning or disinfection.
  - B. Installing shelving
  - C. The unloading of BAC-t sample bottles.
  - D. Ventilation of air.
  - E. None of the Above
29. Upon entering a confined space, your gas meter indicates a reading of 17% O<sub>2</sub>. What is the most appropriate course of action? SAC. Sec. 7.20
- A. Call your supervisor.
  - B. Continue working, no problem.
  - C. Leave the space immediately, continuously ventilate the area and recheck the O<sub>2</sub> concentration
  - D. None of the Above

30. Why are lead pipe service connections no longer allowed to be installed?  
SAC. Sec. 3.625 Topic PM
- A. Lead corrodes fixtures.
  - B. Lead can enter the water.
  - C. Lead is expensive.
  - D. Lead is very heavy and OSHA has set a weight limit on workers.
  - E. None of the Above
31. The purpose of shoring is to? SAC. Sec 3.653
- A. Slow production time.
  - B. Prevent the walls of a trench from collapsing.
  - C. To help the slower operators get out of a collapsing trench, while I jump over them.
  - D. Prevent pipe joints from moving during backfilling.
  - E. None of the Above
32. Disease causing organisms such as bacteria and viruses are better known as?  
SAC. Sec. 6.00
- A. Fecal
  - B. Pathogens
  - C. Carcinogens
  - D. Protozoa
  - E. None of the above
33. The growth rate or metabolism of microorganisms in the water supply system is most affected by? SAC. Sec. 4.502
- A. Price of chemicals
  - B. Temperature
  - C. Alkalinity
  - D. All of the above
  - E. None of the Above
34. In which category would a Gate Valve be classified? SAC. Sec. 3.6200
- A. ASME approved Rotary.
  - B. MSDS approved Diaphragm.
  - C. PETA approved Globe.
  - D. None of the above
35. Turbidity units are a measure of? SAC. Sec. 2.34
- A. Cloudiness of water
  - B. Dirt in the water
  - C. Color in the water
  - D. Odor or TON
  - E. None of the above
36. The most common reason for public water supply contamination is the following?  
SAC. Sec 5.30
- A. Backflow or Cross-Connections
  - B. Backwater
  - C. Improper Sampling
  - D. Backhoes

**Some questions may repeat for QA/QC purposes.**

37. When bumping slip joint pipe, the operator should use a recommended lubricant. Which of the following problems could occur if the wrong lubricant is used? SAC. Sec. 3.654
- A. Bacterial growth
  - B. Release of Lockjaw virus
  - C. OSHA violation
  - D. Does not apply to slip joint pipe, because the pipe is welded.
  - E. None of the Above
38. Spoil from a four-foot trench shall be placed a minimum of \_\_\_\_\_ feet from the edge of the trench. SAC. Sec. 3.6533
- A. Depends if you have a dump truck available
  - B. 1 foot, unless there is a sidewalk.
  - C. 4 feet.
  - D. 2 feet, no matter what.
  - E. None of the Above
39. What effect does a water meter have on a service? SAC. Sec. 3.71
- A. Cavitation
  - B. Head loss
  - C. Pressure loss
  - D. Small taste
  - E. All of the above
40. A minimal shoring system should have? SAC. Sec. 3.6532
- A. Stringers, cross braces and hangers
  - B. Uprights held in place by cross members.
  - C. We do not use shoring.
  - D. All of the above
41. This type of valve controls flow with a flexible material such as rubber? SAC. Sec. 3.6700
- A. Rotometer
  - B. Diaphragm
  - C. Reduced pressure
  - D. Vacuum assisted
  - E. None of the above
42. What conditions would make the Double Check backflow preventer operate to prevent backflow? SAC. Sec. 3.83
- A. Low pressure at the inlet and high pressure at the outlet
  - B. High pressure at the inlet and low pressure on the outlet.
  - C. None of the above
43. What is the purpose of a "Copper Yoke" on a water service line connection? SAC. Sec. 3.81
- A. To prevent meter tampering or vandalism
  - B. To jump a "Stop".
  - C. To secure pipe for a water meter installation.
  - D. To stop a jump.
  - E. None of the Above

**Some questions may repeat for QA/QC purposes.**

44. If the vent line on a ground level storage tank is closed or clogged up, what may happen to the tank when the water level begins to lower? SAC. Sec 2.13
- A. A vacuum will develop in the tank.
  - B. Backpressure will be created in the tank.
  - C. High pressure will be created in the zone.
  - D. Nothing.
  - E. None of the Above
45. Maintaining a continuous positive pressure in the distribution system is essential for preventing? SAC. Sec. 5.4
- A. Backflow conditions.
  - B. Back water.
  - C. Taste and odors.
  - D. Scale.
  - E. None of the Above
46. According to the manual, what is the minimum absolute pressure and minimum working pressure recommended in the distribution system to maintain safe conditions? SAC. Sec. 3.1
- A. 20 psi & 35 psi
  - B. 25 psi & 35 psi
  - C. 35 psi & 35 psi
  - D. 50 psi & 35 psi
  - E. None of the Above
47. The most effective form of chlorine for water disinfection is? SAC. Sec. 6.25
- A. Combined Chlorine residual
  - B. Combined Free Total residual
  - C. Free available residual chlorine
  - D. Breakpoint Chlorine
  - E. None of the Above
48. Climbing safety devices are commonly used on which of the following types of equipment? SAC. Sec. 7.610
- A. Movable extension ladders
  - B. Fixed Ladders
  - C. Ladders in trenches
  - D. Backhoes
49. The best method for operators to learn the health and safety information of a chemical is to? SAC. Sec. 7.68
- A. Study the MSDS
  - B. Ask the Supervisor to taste it first.
  - C. Read the label.
  - D. Consult the Field's instruction guide.
50. All of the following precautions must be taken during a confined space entry **EXCEPT?** SAC. Sec. 7.20
- A. The space should be ventilated.
  - B. There should be an outside attendant
  - C. The confined space atmosphere should be tested.
  - D. The entrant should know CPR and how to apply it to himself.



51. How should an empty chlorine cylinder be stored? SAC. Sec. 6.41
- A. Upright, valve removed
  - B. Upright, unchained
  - C. Upright, grounded
  - D. Upright, tagged as empty
52. As chlorine is added to water containing organic and inorganic compounds, the chlorine will combine with these compounds. If the operator continues to add chlorine, the reaction with these compounds will stop. At this point, the operator is said to have satisfied the? SAC. Sec. 6.221
- A. Chlorine Residual
  - B. Chlorine Dosage
  - C. Chlorine Percentage
  - D. Chlorine Demand
  - E. All of the above
53. Which of the following chemicals is used to dechlorinate a water sample that is used for bacteriological testing? SAC. Sec. 6.34
- A. Sodium Chloride
  - B. Sodium Hydroxide
  - C. Sodium Thiosulfate
  - D. Calcium Thiosulfate
54. Trihalomethanes are an undesirable by-product of chlorination caused by? SAC. Sec. 6.120
- A. The reaction of chlorine with some organic compounds
  - B. Reducing agents
  - C. Carpal Tunnel Syndrome
  - D. Humic and sodium
55. Why would an operator add ammonia to water while disinfecting with chlorine? SAC. Sec. 6.25
- A. To increase the taste of chlorine
  - B. To create Chlororganic compounds
  - C. To create Chloramines
  - D. None of the above
56. Before disinfection of main water lines, the operator should flush the lines at a minimum velocity of? SAC. Sec. 6.310 Table 6.5
- A. 1.0 ft./sec.
  - B. 2.5 ft./sec.
  - C. 2.5 ft./min.
  - D. 10 ft./sec.
  - E. None of the Above
57. At what concentration will chlorine gas be immediately dangerous to life and health? SAC. Table 6.9
- A. 1 PPM
  - B. 1,000 PPM
  - C. 3.5 PPM
  - D. 40 PPM
  - E. None of the Above

58. Chlorine hydrolysis will result in the formation of? SAC. Sec. 6.222
- A. Tubercles
  - B. Hypochlorous acid and hydrochloric acid
  - C. Hypochlorite and Hypochlorous acid
  - D. None of the above
59. What term best represents a reverse flow condition that causes water or mixtures of water and other liquids, gases, or substances to flow back into the distribution system.
- A. Backflow/ Backsiphonage, Either one or a combination of both.
  - B. Backwater
  - C. Water Hammer
  - D. None of the above
60. If the desired result of cleaning large pipes is to remove slime and light scale without disturbing heavier encrustation, the best choice for cleaning would be? SAC. Sec. 5.707
- A. A Scrubie or Pinecone
  - B. Air pressure
  - C. A Pig
  - D. A Puller
  - E. None of the Above
61. Valves can be used to maintain a constant downstream pressure in a water distribution system, regardless of fluctuating demand. An integral component of these valves is? SAC. Sec. 3.7600
- A. A plug
  - B. Pressure reducer valve
  - C. A globe
  - D. A diaphragm
  - E. None of the above
62. Which of the following statements represents the proper operation of ball valves? SAC. Sec. 3.6700
- A. They must be fully open or fully closed
  - B. The stem will open counterclockwise
  - C. You need to have a valve key
  - D. Right on. Left off
  - E. None of the Above
63. From an operator's perspective, standpipes are more desirable than elevated water tanks because? SAC. Sec. 2.12
- A. They are more accessible for observation and sampling
  - B. They do not require any maintenance
  - C. They hold more water and can be easily moved to different facilities
  - D. They offer better pressure
  - E. All of the above
64. Effective operation of a water storage facility includes maintaining - this missing term - recognizing water use patterns and planning accordingly. SAC. Sec 2.31
- A. Adequate water levels
  - B. 100 PSI
  - C. A zero safety policy
  - D. None of the Above

65. The water provider has the responsibility of the water service line up to? SAC. Sec. 3.81
- A. The customer's side of the water meter.
  - B. 100 years
  - C. The property line.
  - D. Depends upon what you call a meter coupling.
  - E. None of the Above
66. Fire hydrants which are classified as "dry-barrel" are used in areas where? SAC. Sec. 3.6700
- A. Freezing may occur.
  - B. There is no need for a kicker.
  - C. Water pressures are adequate.
  - D. Hydrants do need a stem.
  - E. None of the Above
67. Which of the following types of pipes are subject to corrosion? SAC. Sec. 3.64
- A. Lead
  - B. Plastic
  - C. Steel
  - D. Asbestos-cement
  - E. None of the above
68. Before doing any work on any piece of electrical equipment, the operator should perform the following procedure on a piece of equipment? SAC. Sec 7.42
- A. Isolate the work area
  - B. Notify the manufacturer.
  - C. Lock out and tag the equipment, LOTO.
  - D. Grease the rotor
  - E. All of the above
69. What could be done if an elevated storage facility does not provide uniform minimum pressure throughout the system? SAC. Sec 2.30
- A. Use pumps to maintain pressure.
  - B. Raise the elevation of the water storage facility.
  - C. Increase gravity on the system
  - D. All of the above.
70. Which of the following is **NOT** classified as a rotary valve? SAC. Sec. 3.6700
- A. Gate
  - B. Plug
  - C. Butterfly
  - D. Ball
  - E. None of the Above
71. Safety authorities tell us that one out of ten injuries are the result of unsafe acts of either the person injured or someone else. This term is used in the Sacramento manual to describe the lack of experience or training, or a temporary condition that prevents the recognition of a hazard. SAC. Sec 7.11
- A. Ignorance
  - B. Patience
  - C. Indifference
  - D. None of the Above

72. This type of backflow prevention device or method delivers the highest level of protection?  
SAC. Sec. 3.83
- A. AG or Air gap
  - B. RP or Reduced Pressure
  - C. PVB or Pressure Vacuum Breaker
  - D. Air Breaker
  - E. None of the Above
73. Which of the following facilities or pieces of equipment will help prevent water hammer?  
SAC. Sec 2.15
- A. Backflow preventer
  - B. Surge Tank
  - C. Clear Well
  - D. Pressure or Hydropneumatic Tank
  - E. None of the Above
74. A Globe valve would be appropriate for which of the following water line sizes? SAC. Sec. 3.6700
- A. 2 inch
  - B. 6 inch
  - C. 12 inch
  - D. All of the above.
  - E. None of the Above
75. Which of the following devices are used to prevent backflow on service connections?  
SAC. Sec. 3.83
- A. Reduced Pressure Principle Backflow Assembly (RP)
  - B. Pressure Regulator (PR)
  - C. Atmospheric Pressure Air Vacuum Breaker (APAVB)
  - D. All of the Above
76. What term best represents a mechanical device used to prevent backflow?
- A. Reduced Pressure Principle Backflow Assembly
  - B. Backflow-prevention assembly
  - C. Vacuum Breaker
  - D. Double Check
  - E. None of the Above
77. Water meters that are removed from service for repair should be handled in the following manner. SAC. Sec. 5.734
- A. Drain the meter completely.
  - B. Turn off any power and duct tape the glass.
  - C. Place a cap over the meter face and weigh it.
  - D. Seal the meter to retain water.
  - E. None of the Above
78. How can an operator help maintain constant pressure throughout the distribution system?  
SAC. Sec. 2.30
- A. Increase elevated storage tank levels and turn the valve on.
  - B. Use booster pumps.
  - C. Shut off all service connections.
  - D. None of the above.

79. Gauges are often used with pumps so that? SAC. Sec. 2.52
- Direction of flow can be easily determined.
  - Pumping efficiency can be determined.
  - Head loss is minimized.
  - Records can be kept.
  - All of the above
80. What is the purpose of a hydropneumatic tank? SAC. Sec. 2.14
- To prevent a backflow occurrence.
  - To provide air for the water system
  - To prevent a weir.
  - To create pressure in the discharge line.
  - All of the above
81. A ball valve should be operated by? SAC. Sec. 3.6700
- Opening it to 1/3 of fully opened, but slowly.
  - Opening it to either full or closed position.
  - Opening the by-pass first.
  - An operator II
  - None of the Above
82. The principle responsibility of a water supplier in implementing a cross-connection control program is to? SAC. Sec. 5.31
- Look good to the regulators and make-work for desk jockeys.
  - Protect the water supply/distribution system from contamination.
  - Perform annual testing inspections, limit samples.
  - Impress businesses with an RP in front of every facility in town.
  - None of the Above
83. What is the most common type of water valve used in isolating small or medium sized areas in a distribution system? SAC. Sec. 3.6700
- Globe Valve
  - Butterfly Valve
  - Gate Valve
  - None of the Above
84. Convert a flow of 450 gallons per minute to million gallons per day? SAC. Sec. Appendix 130
- .648 MGD
  - .0648 MGD
  - 1440 MGD
  - .1440 MGD
85. Thrust blocks are not required for pipe installations which? SAC. Sec 3.1
- Have welded joints.
  - Are less than 6 inches in diameter.
  - Have All-thread.
  - Connected to fire hydrants.
  - None of the Above

86. How would you categorize a nutating-disk water meter? SAC. Sec. 3.72
- A. Displacement type meter
  - B. Demand type meter
  - C. Compound type meter
  - D. Velocity type meter
  - E. None of the Above
87. Critical operating information for pumps and motors can be quickly found? SAC. Sec. 2.6
- A. Through the manufacturer.
  - B. On the equipment nameplate
  - C. By referring to the specific serial number.
  - D. Because of OSHA requirement C.F.R.
  - E. None of the Above
88. Crenothrix is also known as? SAC. Sec 4.501
- A. Iron Bacteria
  - B. Fecal Bacteria
  - C. Viruses
  - D. Intestinal Parasites
  - E. None of the above
89. Which of the following is more difficult to control? SAC. Sec 4.502
- A. Iron Corrosion
  - B. Plastic Corrosion
  - C. Lead Corrosion
  - D. LOTO
  - E. None of the Above
90. Peak demand on the distribution system is critical to the operation. Peak demand is defined as? SAC. Sec 2.0
- A. The demand needed during the summer
  - B. Average daily flow demand.
  - C. The demand needed during backflow
  - D. The maximum load placed on a water treatment plant and the distribution system as the maximum average load in one hour or less.
  - E. None of the Above
91. Biofilms are the result of a complex interaction among microorganisms. The organisms form –this missing term- and secrete extracellular material that makes them highly resistant to biocides. SAC. Sec 4.502
- A. Microcolonies
  - B. Lantern Rings
  - C. Backflow
  - D. Water Hammers
  - E. None of the Above

92. Which of the following maps would most likely indicate specific information such as the number of turns necessary to open or close a valve? SAC. Sec. 5.91

- A. Valve Intersection Map
- B. As-Built Map
- C. Sectional Plot Map
- D. Plat Map
- E. None of the Above

93. A standpipe should not be located in? SAC. Sec. 2.2

- A. Near a high point in the system.
- B. On top of a hill.
- C. At a low point in the system, a bottom of a hill.
- D. Near an elevated storage facility.
- E. All of the above

94. Normal operation conditions of a water treatment or distribution yard will include? SAC. Sec 2.30

- A. Rainfall
- B. Excessive water demands
- C. Broken or out-of-service pumps
- D. Stale water
- E. None of the Above

95. This type of valve is designed to, 1. Prevent overflows from the storage tank or reservoir, or 2. Maintain a constant water level as long as water pressure in the distribution system is adequate. SAC. Sec 2.31

- A. Double Check
- B. PVB
- C. Altitude-Control Valve
- D. Air Relief
- E. None of the Above

96. Which of the following pumps is consisting of an impeller fixed on a rotating shaft that is enclosed in a casing, and having an inlet and discharge connection? As the rotating impeller spins the liquid around, force builds up enough pressure to force the water through the discharge outlet?

SAC. Sec. 2.33

- A. Centrifugal
- B. Positive displacement
- C. Submersible displacement
- D. Rotator displacement

97. Water quality in a storage facility could degrade due to excessive water age caused by low demands for water and short-circuiting within the distribution storage reservoir. Which of the following are not other reasons for water quality degradation? SAC. Sec 2.35

- A. Poor design
- B. Inadequate maintenance
- C. Sampling program
- D. Improperly applied coating and linings
- E. All of the above

98. When laying pipe, which of the following should be followed first? SAC. Sec. 3.6532
- Lay the bell joint end first.
  - Provide even bedding along the entire length.
  - Support the pipe on a cross brace or extra hard hat.
  - Rest the pipe couplings on the trench bottom.
  - All of the above
99. This term is used to express the electrical pressure available to cause a flow of current when an electric circuit is closed. SAC. Sec 2.42
- Rate
  - Cathodic Force
  - E.M.F.
  - Galvanic Action
  - Shock or Laser
100. This is an electrical system used for the prevention of rust, corrosion, and pitting of metal surfaces which are in contact with water or soil? SAC. Sec 2.42
- E.M.F.
  - Galvanic Protection
  - Cathodic protection
  - None of the above
101. In situations where a valve is not buried and the water system operator will need to know from inspection whether the valve is open or closed, a rising stem valve with an \_\_\_\_\_ is often used. \_\_\_\_\_ are often used for in treatment plants and pumping stations. One answer will answer both parts. AWWA Chap. 3 p. 64-65
- Slide Valve
  - OS&Y
  - Bypass
  - Tapping
  - None of the above
102. \_\_\_\_\_ thrust against the disk of a closed gate valve increases rapidly with valve size. For example, the thrust against a closed valve that is under 75 psi water pressure is approximately 8,480 lb/f for a 12-in valve. This type of valve are smaller-diameter that will allow water to pass around the larger valve. This reduces the differential pressure across the closed disk and makes main valve easier to open and close. \_\_\_\_\_ also provide for low-volume flow without the need for opening the main valve. AWWA Chap. 3 p. 64-65
- Horizontal, Bypass
  - Vertical, Globe
  - Horizontal, Slide
  - Pressure, Inserting
  - None of the above
103. Centrifugal pumps do not generate any suction when dry, so the impeller must be submerged in water for the pump to start operating. If a pump is located above water level, \_\_\_\_\_ is often provided on the suction piping to hold the pump's prime. AWWA Chap. 12 p. 371-372
- Stuffing Box
  - Foot Valve
  - Ejector
  - Pressure Switch



104. The \_\_\_\_\_ is rotated by a pump shaft, usually machined of steel or stainless steel. A common method used to secure the impeller to the shaft on double-suction pumps involves using which method? AWWA Chap. 12, page 381

- A. Lantern Ring, Welding
- B. Lantern Ring, Nuts
- C. Impeller, Epoxy
- D. Cavitation Plate, JB Weld
- E. Impeller, A Key and a tight fit

105. When it is necessary to install a valve in a water main without shutting off pressure, a \_\_\_\_\_ valve can be used. Water utilities normally have this type of valve installed by a company that has the special equipment required to make the installation and specializes in this type of work. AWWA Chap. 3 p. 67

- A. Special inserting Valve
- B. Slide Valve
- C. Globe Valve
- D. Double Check
- E. None of the above

106. Plan and profile drawings, which are used in the construction of parts of the system, are engineering records showing pipe depth, pipe location, and other information as originally proposed. These drawings should be marked as construction takes place to indicate any variations from the original plan. A common abbreviation on plan and profile drawings is "PI". What does this stand for? AWWA Chap. 15 P. 489-490

- A. Point of Intersection
- B. Point of Increase
- C. Point of Tap
- D. Point of Instruction
- E. None of the above

107. Which one of the following statements is correct concerning pressure taps? AWWA Chap. 4 p. 117

- A. Customers are not inconvenienced by having their water turned off.
- B. There is a higher probability of contaminating the water system, particularly if working conditions in the excavation are good.
- C. Fire protection does not remain in service.
- D. The VOCs will change.
- E. None of the above

108. What are the major hydraulic concerns of a water distribution system? SAC. Sec. 3.1

- A. The price of chemicals and personnel
- B. Backflow and alluvial conditions
- C. Will water flow and in which direction
- D. How many valves and fire hydrants can be cut-in on one day
- E. All of the above

109. The \_\_\_\_\_ gauge sensor is the type used most widely in modern instrumentation. AWWA Chap. 14 Page 435

- A. Diaphragm strain
- B. Jackson
- C. Spool
- D. Restrained
- E. None of the above

110. This type of motor is generally used in fractional-horsepower sizes, but they can be supplied with rating up to 10 hp at 120 or 240 volts. AWWA Chap 13 page 401

- A. Starting Motor
- B. Three phase
- C. Single phase
- D. Wound-rotor
- E. None of the above

111. Which of the following is a correct statement concerning a single phase motor. AWWA Chap 13 page 402

- A. In a split-phase motor, the motor has windings.
- B. A repulsion-induction motor is very simple and less expensive than other single phase motors.
- C. A capacitor start motor has a high starting torque and a high starting current.
- D. All of the above

112. Which of the following is not a class of three-phase motors? AWWA Chap 13 page 402

- A. Squirrel-cage
- B. Synchronous
- C. Wound-rotor induction
- D. Split Case
- E. None of the above

113. Operation of chlorination equipment. The \_\_\_\_\_ created by the ejector moves through this device \_\_\_\_\_. This device prevents water from back feeding or entering the vacuum-regulator portion of the chlorinator. SAC. Sec. 6.400

- A. Pressure, Rate valve
- B. Vacuum, The ejector
- C. Backpressure, Interconnection manifold
- D. Vacuum, Check valve assembly
- E. Relief, Rotameter

114. Operation of chlorination equipment. This device is fitted with a \_\_\_\_\_ nozzle which creates the vacuum that moves the chlorine gas. What is the name of this device \_\_\_\_\_? SAC. Sec. 6.400

- A. Venturi, The ejector
- B. Spray, Interconnection manifold
- C. Spray, Check valve assembly
- D. Venturi, Rotameter
- E. Venturi, Hector

115. Operation of chlorination equipment. This device will enable the operator to draw chlorine from several gas cylinders at the same time. SAC. Sec. 6.400

- A. Chlorine fork
- B. The ejector
- C. Interconnection manifold
- D. Check valve assembly
- E. Rotameter

116. Which of the following terms best describes this definition, to trap bubbles in water either mechanically through turbulence or chemically through a reaction? SAC. Sec. 4.504

- A. Alluvial
- B. Backflow
- C. Crenothrix
- D. Entrain
- E. Vacuum

117. Estimate the C Factor for a 10-inch water main. When the flow is 800 GPFM, the drop in pressure head elevation between two pressure gages 500 feet apart is two (2) feet?

SAC. Sec. A.132 Example 10

- A. 132
- B. 193.75
- C. 251
- D. None of the above

118. A 6-inch diameter water main is to be flushed at a 4 ft/sec before disinfection. What should be the reading on the flowmeter in gallons per minute? SAC. Sec. 5.81

- A. 352
- B. 144
- C. .785
- D. 50
- E. None of the above

119. A deep well turbine pump delivers 250 GPM against typical operating heads. If the desired chlorine dose is 2.5 mg/L, what should the chlorine feed rate in pounds per day?

SAC. Sec. A.134 Example 27

- A. 8.34
- B. 2.5
- C. 0.36
- D. 7.5
- E. None of the above

120. A chemical solution tank is 4.5 feet in diameter and 5 feet deep. How long will it take to fill this tank when water flows in at a rate of 3.6 gallons per minute? SAC Sec. A.133, Example 20 1

- A. 2 Hours 45 Minutes
- B. 165
- C. 3.6 hours
- D. 2.75
- E. None of the above

121. A flowmeter indicates a flow rate of seven gallons per minute. How many gallons of water will flow through the meter in three hours and 30 minutes? SAC. Sec. A.133 Ex. 19

- A. 35.7
- B. 3.5
- C. 357
- D. 1,470

122. How many gallons of water must be added to ten gallons of a five percent hypochlorite solution to produce a 1.5 percent hypochlorite solution? SAC Sec. A.134 Example 31 1

- A. 23.3
- B. 50
- C. 15
- D. None of the Above

123. A 6-inch diameter water main needs to be flushed with a water velocity of five feet per second. What should be the flow in gallons per minute? SAC Sec. A.132 Example 7

- A. 0.196
- B. 0.98
- C. 440
- D. 98

124. Determine the chemical feed in pounds per day of  $\text{Cl}_2$  from a hypochlorinator. The hypochlorite solution is 1.4 percent or 14,000 mg  $\text{Cl}_2$  per liter. During a test run the hypochlorinator delivers 400ml during 12 minutes. SAC Sec. A.131 Ex.4

- A. 1.48
- B. 12
- C. 45.4
- D. None of the above

125. Problems with a centrifugal pump. The pump does not deliver water, which of the following would not be the cause of this problem? SAC. Table 2.2

- A. Pump not primed
- B. Water Seal pipe plugged
- C. Pump or suction pipe not completely filled
- D. Suction lift too high
- E. None of the above

126. A "Consecutive public water system" means a public water system that obtains all of its water from?

- A. Combined water systems
- B. Another public water system that is regulated by the Department.
- C. Grandfathered water system
- D. Ground and surface water system
- E. None of the above

127. What term best represents a series of treatment processes, including coagulation and filtration but excluding sedimentation, that result in substantial particulate removal?

- A. Direct Filtration
- B. Water Treatment Plant
- C. Surface Water System
- D. Conventional Filtration

128. Domestic or other non-distribution system plumbing problem" means a total coliform contamination problem in a public water system with more than \_\_\_\_\_ service connection that is limited to a specific service connection from which a total coliform-positive sample is taken.

- A. 1
- B. 100
- C. 1,000
- D. 10,000
- E. None of the above

129. What term best represents the product of the absorbed dose from ionizing radiation and such factors as account for differences in biological effectiveness due to the type of radiation and its distribution in the body as specified by the International Commission on Radiological Units and Measurements?

- A. GC/MS
- B. Gross beta particle activity
- C. Dose Equivalent
- D. HPC
- E. None of the above

130. What term best represents a concentration of a corrosion inhibitor that is sufficient to form a protective film on the interior walls of a pipe?

- A. Galvanic Protection
- B. Effective Corrosion inhibitor residual
- C. C1
- D. REM
- E. Galvanic

131. What term best represents a waiver from a requirement that is not a requirement contained in the National Primary Drinking Water Regulations?

- A. Compliance
- B. Exclusion
- C. Exemption
- D. Show Cause
- E. None of the above

132. The fire hydrants in a distribution system should be color coded for ease of identification by the fire department. Why would the tops of the fire hydrants be painted *green*?

AWWA Table 6.1 Page 169

- A. To identify the class and type
- B. To show that the capacity is over 1,000 GPM
- C. To show that the capacity is over 100 GPM
- D. To help identify that this is a fire hydrant and not a water valve

133. What is the term used to describe a *steel specimen* which is inserted into water to measure the corrosiveness of water. SAC. Sec 6.222

- A. Steel Sample or SS
- B. Coupon
- C. Donut
- D. Corp
- E. None of the above

134. What are the compounds which are formed by the reaction of hypochlorous acid or aqueous chlorine? SAC. Sec 4.502

- A. VOCs
- B. SOCs
- C. TTHMs
- D. None of the Above

135. Why would a pump engineer design a system that would use multiple pumps for a parallel operation? AWWA Appendix D Page 552

- A. To provide for a fluctuating demand
- B. To provide an increased discharge head
- C. To reduce the friction coefficient on a larger pump for greater efficiency
- D. All of the above

136. This is a reverse flow condition, caused by a difference in water pressures, which causes water to flow back into the distribution pipes of a potable water supply from any source other than the intended source. SAC. Sec 5.30

- A. Backflow
- B. Back Water
- C. Back Pressure
- D. Backsiphonage
- E. None of the above

137. What term is used to describe a pressure that can cause water to backflow into the water supply when a user's water system is at a higher pressure than the public water system? SAC. Sec 5.30

- A. Back Pressure
- B. Backflow
- C. Back Water
- D. Backsiphonage
- E. None of the above

138. What term describes a form of backflow caused by a \_\_\_\_\_ or below atmospheric pressure within a water system? SAC. Sec 5.30

- A. Positive, Backflow
- B. Negative, Back Water
- C. Positive, Back Pressure
- D. Negative, Backsiphonage
- E. None of the above

139. Which of the following is not a benefit resulting from a water audit? SAC. Sec 5.701

- A. Reduced Water losses
- B. Reduced Sampling
- C. Financial Improvement
- D. Reduced Property Damage
- E. None of the above

140. Water should be delivered at a minimum desirable pressure of \_\_\_\_\_ and at an absolute minimum pressure of? SAC. Sec 3.2

- A. 35 PSI, 20 PSI
- B. 35 PSIG, 15 PSIG
- C. 20 PSI, 15 PSI
- D. 15 PSI, 5 PSI

141. This term means the aliquot of finished drinking water that is examined for the presence of coliform bacteria. This sample volume is 100 milliliters and is commonly referred to as?

- A. Surface Water Sample
- B. Standard Sample
- C. Composite
- D. TPH
- E. None of the above

142. Four different pressure rating pipe classes are commonly encountered in water distribution systems, which of the following are the most common? SAC. Sec. 3.61

- A. 100, 150, 200, 250 PSI
- B. Class 1,2,3,4
- C. Ductile, Plastic, ACP, Galvanized
- D. Fire, Pressure, Domestic, and Irrigation
- E. None of the above

143. Steel pipe has long been popular in water systems. This pipe is available in sizes from ½ inch to 144 inches in diameter. What is a common term that means to coat a metal, especially iron or steel, with zinc? SAC. Sec 3.621

- A. Protected
- B. Cathodic
- C. Galvanize
- D. Dielectric
- E. All of the Above

144. Which of the following is the best means for determining a pattern of a developing problem with the water utility's distribution service? SAC. Sec. 5.13

- A. Represent complaints on a map with colored pins
- B. Hazen-Williams Formula
- C. Matrix
- D. Statistically analyze all complaints using the Edward S. Deming formula
- E. None of the above

145. Supervisors and Foremen should warn operators about the presence of \_\_\_\_\_. This can be accomplished by \_\_\_\_\_? SAC. Sec. 7.63

- A. Confined Spaces, Clearly posting appropriate signage at all entries to confined spaces
- B. Confined Spaces, The buddy system
- C. Dihydrogen oxide, Regular safety meetings
- D. O<sub>2</sub>, Tailgate meetings
- E. None of the above

146. A metered water system is one in which meters are used at all strategic points. What are two main classifications of water meters? SAC. Sec 3.72

- A. Displacement, Velocity
- B. Nutating, Piston
- C. Turbine, Propeller
- D. None of the above

147. Water mains parallel to sewer mains shall be installed at least how many feet vertically away or higher? SAC. Sec 3.651

- A. 10
- B. 2
- C. 1
- D. Does not matter
- E. None of the above

148. What is the purpose of a vulnerability assessment? SAC. Sec. 5.12

- A. To determine weaknesses in emergency inventory reserves
- B. To determine weaknesses throughout the entire emergency preparedness system
- C. To determine weaknesses after the terrible Y2K event
- D. To determine weaknesses in the mutual aid system
- E. None of the above

149. Supervisors and managers must consider a variety of issues, when it comes to selecting tools and equipment, one should not be? SAC. Sec. 5.10

- A. The public's perception of impropriety
- B. Cost and efficiency
- C. Tool versatility and multi-use function
- D. Shorter service interruptions

150. Proper management of an effective cross-connection control program should include all of the following EXCEPT? SAC. Sec. 5.32

- A. Enactment of an ordinance
- B. Routine inspection and testing procedures
- C. Training of personnel to recognize potential cross-connections
- D. Requiring each customer to have a RP
- E. None of the above

151. Policies, objectives and procedures are important steps in developing a safety program. What should management do to assure that this program is successful? SAC. Sec. 7.01

- A. Call OSHA for an inspection
- B. Fire all employee which do not wear hard hats, except likable Foremen
- C. Write safety notes and post on pay stubs
- D. Continually evaluate the safety program
- E. None of the above

152. What would you use the \_\_\_\_\_ formula in the water distribution field?  
AWWA Chap. 1

- A. Ploughe Matrix, Figuring Budgets
- B. Hazen-Williams, Figuring Fire control capacities
- C. S.O.P. 1, Figuring Peak Demand
- D. Hazen-Williams, Figuring Pipe Size
- E. None of the above



153. For a dead-end line of over 2,000 feet, the design criteria would dictate a minimum pipe diameter of \_\_\_\_\_ inches. SAC. Sec. 3.2

- A. 4
- B. 6
- C. 8
- D. 12

154. What is the SWDA term used to express levels for several organic and inorganic constituents, odor, color, pH, and TDS? SAC. Sec 4.1

- A. Secondary Standards
- B. Primary Standards
- C. TOC
- D. SOC
- E. None of the above

155. When the superintendent is inspecting the plans for a new ground water storage tank, the superintendent should pay attention to the inlet and outlet of this tank. What design factor should be noticed? SAC. Sec. 3.43

- A. The inlet must be twice the size of the outlet
- B. The outlet must be twice the size of the inlet
- C. The outlet and inlet should be on opposite sides of the tank
- D. The outlet and inlet should be on the top
- E. None of the above

156. Before anyone ever enters a storage tank for any reason, Confined Space Safety Procedures must be followed. Which of the following is incorrect? SAC. Sec 2.41 Safety Notice

- A. Oxygen should be 19.5 to 23.5% before entering
- B. One person trained in Ergo
- C. A self-contained breathing apparatus may be necessary
- D. All persons entering the tank must have a safety harness
- E. None of the above

157. If \_\_\_\_\_ pressure in a system is a problem, you should install? SAC. Sec 3.2

- A. High, A Pressure Reducing Valve
- B. Reduced, A Pressure Reducing Valve
- C. Unstable, A Reduced Pressure Principle
- D. Low, A Vacuum Relief
- E. None of the above

158. The valve layout in a distribution system is very important. In general, valves on water mains of 12 inches in diameter and smaller should be located so that water main lengths of not more than \_\_\_\_\_ and can be isolated by valve closures. SAC. Sec 3.2

- A. 500 Feet
- B. 1000 Feet
- C. 250 Feet
- D. 100 Feet
- E. None of the above

159. Whenever excavation is necessary for repairs or new construction, what is necessary to protect operators from cave-ins? Another excavation consideration when determining safety is the length of time that the excavation will be open. SAC. Sec. 3.6531

- A. Shoring
- B. Trenching
- C. Backfill
- D. Snoring
- E. Clevis

160. A single-phase motor is receiving adequate power and the run windings are operable, but the motor will not start, what could be the problem? AWWA Chap. 13

- A. The switch is closed
- B. There is a problem with the stator
- C. There is a problem with the start winding
- D. There is a problem with the Rotor Monitor
- E. None of the above

161. The purpose of a sump on a vertical turbine pump is used to maintain adequate? AWWA Chap. 12

- A. Pressure for the foot valve
- B. Backpressure
- C. Cavitation diffusion
- D. Liquid above the suction level
- E. None of the above

162. What does a concentration of 0.015 mg/L for lead or 1.3 mg/L for copper represent?

- A. Action Level
- B. Non-Compliance
- C. MCL
- D. Trigger Level
- E. None of the above

163. An "Air-gap separation" means a physical separation between the discharge end of a supply pipe and the top rim of its receiving vessel, which has a separation distance equal to at least?

- A. 1 inch or twice the diameter of the supply pipe, whichever is greater.
- B. 2 Inches
- C. 1 inch or three times the diameter of the supply pipe.
- D. 1 inch
- E. None of the above

164. What term best presents the routine monitoring of contaminants covered under the monitoring assistance program for the purpose of determining compliance with the MCLs, and the monitoring requirements, not including repeat monitoring necessary for compliance after detection of a contaminant or an MCL violation?

- A. Baseline Sampling
- B. BAT
- C. Non-Community Standard
- D. CWS
- E. None of the above

165. Which of the following types of motors would be expected to have the lowest demand for starting current? AWWA Chap. 13 P. 403-404

- A. Wound-rotor induction motor
- B. Squirrel Cage induction motor
- C. Rotor Synch motor
- D. None of the Above

166. Biological contaminants include pathogenic organisms including Salmonella, Shigella, and Vibrio Cholerae. These are examples of? SAC Table 4.1

- A. Bacteria
- B. Bugs and worms
- C. Viruses
- D. Intestinal Parasites
- E. None of the above

167. As the wear ring inside a centrifugal pump loses tolerance between the impeller and wear ring, the efficiency of the pump will? AWWA Chap. 12

- A. Remain the same
- B. Fluctuates with the velocity of water
- C. Decreases
- D. Increases

168. If the pH of water from a dead-end line begins to drop, it is most likely an indication that? SAC. Sec. 4.511

- A. The main is being flushed regularly
- B. There is a redwood plug in the main
- C. Anaerobic conditions are present
- D. None of the above

169. Continuous leakage from a mechanical seal indicates? AWWA Chap. 12

- A. An abnormal condition
- B. A normal condition
- C. Packing needs to be tightened
- D. Mechanical gland needs to be replaced
- E. None of the above

170. What is the most likely choice for the result of grease coming in to contact with the windings of a motor? AWWA Chap. 13

- A. The winding insulation may deteriorate
- B. The overloads will trip
- C. There will be a phase monitor problem
- D. The torque converter will fail
- E. None of the above

171. Fire hydrants should not be more that \_\_\_\_\_ apart to avoid excessive Head Loss in fire hoses when fighting a fire. SAC. Sec 3.672

- A. 1000 Feet
- B. 500 Feet
- C. 250 Feet
- D. 100 Feet
- E. None of the above

172. Multistage centrifugal pumps can discharge high pressure water. The pressure increases with the number of stages but what happens to the capacity/ flow of the pump? AWWA Chap. 12

- A. The flow will remain the same through each stage
- B. The flow is decreased by 25% for each stage
- C. The flow will double with each stage
- D. The flow is cut in half

173. A treatment plant is using manganese products to treat finished water for taste and odor complaints. One resulting problem of this treatment can be? SAC. Sec. 4.41

- A. DBPs
- B. Colored water
- C. HPCs
- D. Greenhouse effect
- E. None of the above

174. What will cause the water quality complaint of "milky water"? SAC. Sec. 4.504

- A. Entrained air
- B. DO
- C. Excessive Chlorine
- D. None of the above

175. Coliform bacteria can sometimes grow in distribution systems although the water delivered is acceptable and there is no obvious contamination. What term is used in the industry to describe this occurrence? SAC. Sec. 4.502

- A. Biofouling or after growth
- B. Incubation
- C. Spontaneous biogeneration
- D. Spontaneous combustion
- E. None of the above

176. An open water reservoir can lead to which of the following water quality problem? SAC. Sec. 4.520

- A. Milky water
- B. Insects or/and larvae
- C. Phenols
- D. Nitrates
- E. None of the above

177. During a recent heat wave, complaints about taste and odor problems began increasing significantly. This probably happened because? SAC. Sec. 4.503

- A. The warmer temperatures accelerate the nitrate removal
- B. The warmer temperatures accelerate the chlorine syndrome
- C. The warmer temperatures accelerate the C Factor
- D. The warmer temperatures accelerate the decomposition of organic matter
- E. None of the above

178. An electric motor that has a frequency of 60Hz will have a maximum synchronous speed of ? AWWA Chap. 13

- A. 600 rpms
- B. 3600 rpms
- C. 1200 rpms
- D. None of the Above

179. A chlorinator system uses an eductor to inject chlorine into the water. The eductor or referred to as an ejector is a device that produces? SAC. Sec. 6.400

- A. Positive
- B. Negative pressure
- C. Chlorine into HTH
- D. None of the above

180. Air valves in the distribution system lines must be placed in locations that cannot be flooded. This is to prevent water contamination. What customer complaint is sometimes solved by the installation of air relief valves? SAC. Sec. 4.515

- A. Taste and odors
- B. MIB
- C. Constipation
- D. Milky water
- E. None of the above

181. Which of the following problems is caused by the presence of Iron Bacteria? An iron bacterium in the water system is a great concern to distribution operators. SAC. Sec. 4.501

- A. Coliform bacteria production
- B. Deposits form in the pipe
- C. Increased chlorine concentrations
- D. The pH will change
- E. None of the above

182. On most kilowatt meters, the current kilowatt load is indicated by? AWWA Chap. 14 P. 440-441

- A. The Primary or Binder dial
- B. Disk revolutions
- C. Current load dial
- D. None of the above

183. Transmitting equipment requires installation where temperature will not exceed? AWWA Chap. 14

- A. 100 degrees F.
- B. 100 degrees C.
- C. 130 degrees F.
- D. 130 degrees C.
- E. None of the Above

184. Several types of flowmeters are used in distribution systems, and each has its own particular maintenance requirements. Inspection of magnetic flow meter instrumentation should include? AWWA Chap. 14 P. 464-465

- A. Checking for corrosion or insulation deterioration
- B. Checking EMF on the hemisphere transducer
- C. Placing a bucket of water for your feet
- D. Polarity multiplexing
- E. None of the above

185. The Jackson turbidimeter is? SAC. Sec 2.34

- A. A visual method to measure cloudiness in water
- B. An instrumental method based on deflected light
- C. Both 1 & 2
- D. None of the above

186. A diaphragm element being used as a level sensor would be used in conjunction with a? AWWA Chap. 14

- A. Pressure Sensor
- B. Manometer
- C. Rotometer
- D. Redwood plug
- E. None of the above

187. Corrosion may occur either on the inside or outside of the metal surface of a storage facility. Many factors influence the rate of corrosion. The warmer the water, the faster the chemical corrosion reaction. Another factor in corrosion Cathodic protection. Which of the following terms is used to express the electrical pressure available to cause a flow of current when an electric circuit is closed. SAC. Sec 2.42

- A. Rate
- B. E.M.F.
- C. Cathodic Force
- D. Galvanic Action
- E. None of the above

188. Which of the following is **NOT** a pressure sensing device? AWWA Chap. 14 Page 435

- A. Campos Gauge
- B. Helical Sensor
- C. Bourdon Tube
- D. Bellows Sensor
- E. None of the above

189. Which of the following terms best describes the following definition, this is a significant function of automated maintenance systems. An effective \_\_\_\_\_ means less time spent on corrective maintenance, resulting in better planning and increased productivity. The reliability of equipment can also be substantially improved. AWWA Chap. 15

- A. Preventive Maintenance
- B. Reporting
- C. System Integration
- D. None of the above

190. \_\_\_\_\_ systems must often transmit more than one signal. Which of the following is **NOT** a means for transmitting multiple signals? AWWA Chap. 14

- A. Solid state, Polling
- B. SCATA, Scanning
- C. Multiplexing, Scanning
- D. Telemetry, Pulse-duration modulation
- E. None of the above

191. If valve and hydrant maps are to be effective, the maps must?  
AWWA Chap. 15

- A. Provide measurements to appurtenances from permanent references/tie and measure
- B. Show as-builds
- C. Have the Operator's name on each valve
- D. Show the size the stem
- E. None of the above

192. A water storage facility should be able to provide water for the average and peak demands. What is the average demand? SAC. Sec 2.0

- A. The total demand for water during the period of time divided by the number of days in that time period.
- B. The maximum momentary load placed on a water treatment plant, pumping station or distribution system.
- C. None of the above

193. Cathodic protection systems not only prevent corrosion, but can reduce time and money spent cleaning and painting. To fully understand Cathodic protection, you must have a basic understanding of electrical principles. What is the term is used to express an electrically charged atom, radical or molecule formed by the loss or gain of one or more electrons? SAC. Sec 2.42

- A. Anode
- B. Cathode
- C. Ion
- D. EMF
- E. None of the above

194. Intersection indexes can be prepared by? AWWA Chap. 15

- A. Assigning numbers to each intersection
- B. Alphabetizing street names
- C. LIST Program
- D. SCADA computer
- E. None of the above

195. OSHA defines a \_\_\_\_\_ as the following? SAC. Sec 3.6533

- A. "Competent person", A person capable of identifying existing predictable hazards in the surroundings
- B. "Competent person", A person not only that accepts responsibility, but is authorized to change any predetermined shoring system when soil conditions change.
- C. Both A & B
- D. None of the above

196. What is the name of a map that an operator would use on a day to day basis that provides detailed drawings of distribution zones, but do not show all the system components?

AWWA Chap. 15

- A. Sectional Maps
- B. Leak survey maps
- C. Comprehensive maps
- D. Supervisor's Map
- E. None of the above

197. Which of the following is not a storage facility? SAC. Sec 2.1

- A. Standpipe
- B. Clear wells
- C. Surge tank
- D. Hydropneumatic or pressure tanks
- E. None of the above

198. Here are some water quality trouble signs: High chlorine residual, biological growth microorganisms, dead-end mains. What type of complaints will you generally get with these problems? SAC. Table 2.1

- A. Turbidity
- B. Taste and Odors
- C. Color
- D. Negative Coliform Results
- E. All of the above

199. Water quality in a storage facility could degrade due to excessive water age caused by low demands for water and short-circuiting within the distribution storage reservoir. Which of the following are not reasons for water quality degradation? SAC. Sec 2.35

- A. Poor design
- B. Inadequate maintenance
- C. Sampling program
- D. Improperly applied coating and linings
- A. None of the above

200. Organics are chemical substances which are based on the element Carbon. They also can be man-made synthetic compounds such as pesticides, herbicides and? SAC. Sec. 4.2

- A. VOCs
- B. TPH
- C. Trihalomethanes
- D. SOCs
- E. None of the above



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