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Technical Learning College requires that our students who takes a correspondence or home study program course must pass a proctored course reading, quiz and final examination. The proctor must complete and provide to the school a certification form approved by the commission for each examination administered by the proctor.

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2. The licensee showed me positive photo identification prior to completing the examination.
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Please write down any questions you were not able to find the answers or that have errors.

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Select one answer per question. Please utilize the answer key.

(s) on the answer will indicate either plural and singular tenses.

Please write down any questions you were not able to find the answers or that have errors.

Hyperlink to the Glossary and Appendix
http://www.abctlc.com/downloads/PDF/WTGlossary.pdf

Water Distribution Section

System Elements

1. In the distribution system, storage reservoirs are structures used to store water and _____ the supply or pressure.

A. Increase water pressure
B. Equalize
C. Provide a reserve pressure for
D. None of the above

Butterfly Valve

2. Butterfly valves are rotary type of valves usually found on large transmission lines, and may also have an additional valve beside it known as a_____ to prevent water hammer.

A. Regulator
B. Bypass
C. PRV
D. None of the above

Water Distribution Valves

3. For large shutoff valves, it is necessary to surround the valve operator or entire valve within a vault or manhole to allow?

A. Bluestakes
B. Testing
C. Repair or replacement
D. None of the above

Gate Valves

4. If the valve is wide open, the gate inside the valve is _____ into the valve bonnet.

A. Fully drawn up
B. Fully down
C. Fully closed
D. None of the above

5. There is little pressure drop or flow restriction through gate valves; however, gate valves are not suitable for?

A. Pressure drops
B. Isolation
C. Throttling purposes
D. None of the above

Ball Valves

6. Ball valves should be either fully-on or fully-off, some ball valves also contain a swing check located within the ball to give the valve a check valve feature.

A. True B. False

Water Pressure

7. 2.31 feet of water is equal to 1 psi, or 1 foot of water is equal to about a half a pound (.433 pounds to be exact).

A. True B. False

8. For ordinary domestic use, water pressure should be between 25 and 45 psi.

A. True B. False

9. 20 psi is the minimum pressure required at any point in the water system, so that _____ is prevented.

A. Cavitation C. Backflow and infiltration
B. Back pressure D. None of the above

10. Which of the following is provided from the direct force of the water, or by the height of the water?

A. Pressure C. Maximum daily use
B. System integrity D. None of the above

Water Use or Demand

11. Water system demand comes from many sources including residential, commercial, industrial and public consumers as well as waste and some?

A. Pressure C. Unavoidable loss
B. System integrity D. None of the above

12. The combination of storage reservoirs and distribution lines must be capable of meeting consumers' needs for pressure at all times.

A. True B. False

Water Storage Introduction

13. Which of the following prevents contamination of water as it travels to the customer, finished water storage facilities are an important component of the protective distribution system?

A. Cathodic protection C. Barrier
B. Corrosion protection D. None of the above

Storage and Distribution

14. Proper construction is important in maintaining system integrity and the distribution system must also protect?

A. Cathodic protection C. Water quality
B. Corrosion protection D. None of the above

Water Storage Facilities

15. Water storage facilities and tanks vary in different types that are used in the water distribution systems, such as stand pipes, elevated tanks and reservoirs, hydropneumatic tanks and?

A. Surge tanks C. Storage reservoirs
B. Water distribution systems D. None of the above

(S) Means the answer can be plural or singular in nature

Storage Reservoirs

16. The text recommends that _____ be located at a high enough elevation to allow the water to flow by gravity to the distribution system.

A. Storage reservoirs C. Tree systems
B. Levelers D. None of the above

Steel Reservoirs

17. Steel reservoirs or tanks generally have higher construction and installation costs than concrete, and require less maintenance.

A. True B. False

Cross-Connection Section

What is Backflow?

18. Backflow is the undesirable reversal of flow of nonpotable water or other substances through a _____and into the piping of a public water system or consumer's potable water system.

A. Backflow C. Cross-connection
B. Indirect connection D. None of the above

19. Which of the following can occur when there is a stoppage of water supply due to nearby firefighting, a break in a water main?

A. Backsiphonage C. Cross-connection
B. Backpressure D. None of the above

20. Which of the following is a type of backflow caused by a downstream pressure that is greater than the upstream or supply pressure in a public water system or consumer's potable water system?

A. Backflow C. Indirect connection
B. Backpressure D. None of the above

21. Which of the following can result from an increase in downstream pressure, a reduction in the potable water supply pressure, or a combination of both?

A. Backflow C. Backsiphonage
B. Backpressure D. None of the above

22. Which of the following can have two forms-backpressure and backsiphonage?

A. Backflow C. Cross-connection
B. Backpressure D. None of the above

23. The basic mechanism for preventing backflow is a mechanical _____, which provides a physical barrier to backflow.

A. Air gap C. Backflow
B. Backflow preventer D. None of the above

24. The principal types of mechanical backflow preventer are the reduced-pressure principle assembly, the _____, and the double check valve assembly.

A. Vacuum breaker C. Backflow check
B. Air gaper D. None of the above

25. Which of the following is a means or mechanism to prevent backflow?

A. Check device or method C. Backflow check valve
B. Backflow preventer D. None of the above

26. According to the text, basic means of preventing backflow is a(n) _____, which either eliminates a cross-connection or provides a barrier to backflow.
A. Vacuum breaker C. Backflow check
B. Air gap D. None of the above

Types of Backflow Prevention Methods and Assemblies
27. The type of device selected for a particular backflow installation depends on several factors.
A. True B. False

28. When the _____is restricted, such as the case of an air gap located near a wall, the air gap separation must be increased.
A. Air break C. Airflow
B. Barrier to backflow D. None of the above

29. An air gap is a physical disconnection between the free flowing discharge end of a potable water pipeline and the top of a(n)?
A. Open receiving vessel C. Barrier to backflow
B. Air break D. None of the above

30. Which of the following must be at least two times the diameter of the supply pipe and not less than one inch?
A. Open receiving vessel C. Air gap
B. Air break D. None of the above

31. An air break is a physical separation between the free flowing discharge end of a potable water supply pipeline, and the overflow rim of an open or non pressure receiving vessel.
A. True B. False

32. According to the text, air gap separations must be vertically orientated a distance of at least twice the inside diameter of the supply, but never less than?
A. 1 inch C. 12 inches
B. 2 inches D. None of the above

33. An obstruction around or near an _____ may restrict the flow of air into the outlet pipe and nullify the effectiveness of the air gap to prevent backsiphonage.
A. Open receiving vessel C. Air gap
B. Air break D. None of the above

34. An air gap is acceptable for _____ and is theoretically the most effective protection.
A. High hazard installations C. Low pollutional hazards
B. High pollutional concerns D. None of the above

Vacuum Breakers
35. Which of the following devices can have two primary types: atmospheric and pressure.
A. Vacuum breaker(s) C. Hazard application(s)
B. Atmospheric vacuum breakers D. None of the above

36. Both vacuum breakers devices primary purpose is to protect the water system from cross connections due to submerged inlets, such as irrigation systems and tank applications.
A. True B. False

37. If either reduced pressure backflow assembly check valve leaks, the differential pressure relief valve maintains a differential pressure of at least two (2) psi between the supply pressure and the zone between the two check valves by discharging water to atmosphere.
A. True B. False

38. According to the text, the reduced pressure backflow assembly or RP is designed to prevent backflow caused by backpressure and backsiphonage from low to high health hazards.
A. True B. False

39. According to the text, the RP needs to installed 12 inches above the ground for testing purposes only.
A. True B. False

40. The reduced pressure backflow assembly can be used for high hazard situations under backpressure only. Under normal conditions, the second check valve should never close.
A. True B. False

41. According to the text, if the second check valve fails or becomes fouled and backflow into the reduced pressure zone occurs, the relief port vents the backflow to atmosphere.
A. True B. False

42. According to the text, the reduced pressure zone port opens anytime pressure in the zone comes within 2 psi of the supply pressure.
A. True B. False

Pump and Motor Section

Common Hydraulic Terms

43. Which of the following definitions is the engineering science pertaining to liquid pressure and flow?
A. Hydraulics C. Hydrokinetics
B. Hydrology D. None of the above

44. Which of the following definitions is the pressure exported by the atmosphere at any specific location?
A. Pressure, Atmospheric C. Pressure, Gauge
B. Pressure, Static D. None of the above

45. Which of the following definitions is pressure above zero absolute, i.e. the sum of atmospheric and gauge pressure?
A. Pressure, Atmospheric C. Pressure, Gauge
B. Pressure, Static D. None of the above

46. Which of the following definitions is the force per unit area, usually expressed in pounds per square inch?
A. Pressure, Absolute C. Pressure, Gauge
B. Pressure D. None of the above

47. Which of the following definitions is the pressure differential above or below ambient atmospheric pressure?
A. Pressure, Absolute C. Pressure, Gauge
B. Pressure D. None of the above

48. Which of the following definitions is height of a column or body of fluid above a given point expressed in linear units?
A. Head, Friction C. Head
B. Head, Static D. None of the above

49. Which of the following definitions is required to overcome the friction at the interior surface of a conductor and between fluid particles in motion?
A. Head, Friction C. Head
B. Head, Static D. None of the above

50. Which of the following definitions is the pressure in a fluid at rest?
A. Head, Friction C. Head
B. Pressure, Static D. None of the above

51. Which of the following definitions is the height of a column or body of fluid above a given point?
A. Head, Friction C. Head
B. Head, Static D. None of the above

52. Sea level pressure is approximately 2.31 pounds per square inch absolute, 1 bar = .433psi.
A. True B. False

General Pumping Fundamentals
53. Here are the important points to consider about suction piping when the liquid being pumped is below the level of the pump: Sometimes suction lift is also referred to as 'positive suction head'.
A. True B. False

54. According to the text, suction lift is when the level of water to be pumped is below the?
A. Impeller C. Centerline of the pump
B. Suction D. None of the above

55. The suction side of pipe should be one diameter smaller than the pump inlet.
A. True B. False

56. The required eccentric reducer should be turned so that the top is flat and the bottom tapered.
A. True B. False

Pumps
57. Pumps are excellent examples of?
A. Hydrostatics C. Multi-stage pumps
B. Quasi-static devices D. None of the above

58. Positive displacement pumps have a piston (or equivalent) moving in a closely-fitting cylinder and forces are exerted on the fluid by motion of the piston.
A. True B. False

59. More complicated pumps have valves check valves that open to allow _____, and close automatically to prevent reverse flow.
A. Pistons C. Passage in one direction
B. Diaphragms D. None of the above

(S) Means the answer can be plural or singular in nature

Pump Categories

60. The key to understanding a pump's operation is that a pump is to move water and generate the _____ we call pressure.

A. Delivery force C. Diaphragm pressure
B. Impeller force D. None of the above

61. With a centrifugal pump the pressure is not referred to in pounds per square inch but rather as the equivalent in elevation, called?

A. Inward force C. Delivery force
B. Head D. None of the above

62. According to the text, pumps may be classified based on the application they serve.

A. True B. False

Basic Water Pump

63. The centrifugal pumps work by spinning water around in a circle inside a?

A. Vortex C. Cylindrical pump housing
B. Cylinder D. None of the above

64. As the water slows down and its kinetic energy decreases, that water's pressure potential energy increases.

A. True B. False

65. In the operation of the pump, the water at the edge of the _____ inward on the water between the impeller blades and makes it possible for that water to travel in a circle.

A. Inward force C. Center of the impeller
B. Pump pushes D. None of the above

Types of Water Pumps

66. The water production well industry almost exclusively uses Turbine pumps, which are a type of centrifugal pump.

A. True B. False

67. The size and number of stages, horsepower of the motor and _____are the key components relating to the pump's lifting capacity.

A. Pumping head C. Horsepower
B. Atmospheric pressure D. None of the above

68. The shaft turns the impellers within the pump housing while the?

A. Desired pumping rate is obtained C. Water moves up the column
B. Horsepower turns the shaft D. None of the above

69. The rotating shaft in a line shaft turbine is actually housed within the column pipe that delivers the water to the surface.

A. True B. False

70. The size of the _____are selected based on the desired pumping rate and lift requirements.

A. Impeller(s) C. Column, impeller, and bowls
B. Lantern ring D. None of the above

Safety Section

Excavation and Trenching Section

71. According to the text, the _____ was revised because excavating is the most dangerous of all construction operations.
A. Competent rule
B. OSHA excavation standard
C. Emergency rule
D. None of the above

72. OSHA also revised the _____ to clarify the requirements.
A. Competent rule
B. Existing standard
C. Protective equipment standard
D. None of the above

73. The performance criteria in the new standard provides employers with options when classifying soil and when selecting methods to protect the _____ from cave-ins.
A. Competent person
B. Employee
C. Construction equipment
D. None of the above

74. Although employers have options when meeting some of the requirements, _____ must realize that the employee must be protected at all times.
A. Competent persons
B. Employers
C. Contractors
D. None of the above

75. Professional engineers will be required in some situations to plan or design the excavation and/or method of protecting the worker.
A. True
B. False

Competent Person

76. The _____has authorization to take prompt corrective measures to eliminate identified hazards.
A. Competent person
B. Contractor
C. Watchman
D. None of the above

77. A _____ must have specific training in and be knowledgeable about soils analysis, the use of protective systems and the requirements of 29 CFR Part 1926.650-652 Subpart P.
A. Competent person
B. Contractor
C. Watchman
D. None of the above

78. Everyone is required to practice _____ one a year.
A. Competent person training
B. Rescue training exercises
C. Emergency procedures
D. None of the above

Competent Person Duties

79. The competent person performs daily inspections of the protective equipment, _____, safety equipment, and adjacent areas.
A. Work progress
B. Construction Crew
C. Trench conditions
D. None of the above

80. The competent person shall make _____ prior to the start of work and as needed throughout the shift.
A. Personnel assignments
B. Training available
C. Inspections
D. None of the above

81. The competent person shall make _____ after every rainstorm or other hazard occurrence.
A. Inspections C. Protective equipment available
B. Training available D. None of the above

82. The competent person must have knowledge of _____, telephone or radio dispatch.
A. Personnel assignments C. Emergency contact methods
B. Work schedules D. None of the above

83. The competent person removes employees and _____ from hazardous conditions and makes all changes necessary to ensure their safety.
A. Competent persons C. Protective equipment
B. All other personnel D. None of the above

84. The competent person makes sure that all _____ have proper protective equipment, hard-hats, reflective vests, steel-toed boots, harnesses, eye protection, hearing protection and drinking water.
A. Competent persons C. Employees
B. Contractors D. None of the above

Scope of Work
85. According to the text, during excavation work a competent person shall be on the job site at all times when personnel are working within or around the _____.
A. Competent person C. Excavation
B. Contractors D. None of the above

86. Prior to opening an excavation, the estimated locations of _____ that reasonably may be expected to be encountered during excavation work shall be determined.
A. Unauthorized persons C. Underground utility installations
B. Employees D. None of the above

87. _____ shall be taken to protect employees against the hazards posed by water accumulation in the excavation.
A. Additional care C. Ladders
B. Adequate precautions D. None of the above

88. In trench excavations that are four (4') feet or more in depth, a stairway, ladder, or ramp shall be used as a _____.
A. Tool C. Bridge
B. Means of access or egress D. None of the above

89. When excavations are made in vehicular traffic areas, _____ shall wear a warning vest made with reflective material or highly visibility material.
A. Competent persons C. Rescue personnel
B. Each employee D. None of the above

90. The air shall be tested in excavations where _____ exist, or could be reasonably expected to exist.
A. Limited visibilities C. Oxygen deficiency or gaseous conditions
B. Employees D. None of the above

91. When the atmosphere contains less than 19.5 percent oxygen, the area must be continuously ventilated until the _____.
A. Excavation is closed
B. Employees enter the space
C. Oxygen levels are above 19.5 percent
D. None of the above

92. Where a _____, the area shall be ventilated until the flammable gas concentration is below 20 percent of the LFL (lower flammable limit).
A. Competent person requires monitoring
B. Gaseous condition exists
C. Worker encounters fumes
D. None of the above

93. Whenever _____ exist or could reasonably exist, the air must be monitored continuously to assure that workers are protected.
A. Traffic conditions
B. Excavations
C. Oxygen deficiency or gaseous conditions
D. None of the above

94. Where the stability of adjoining buildings, walls or other structures are _____, shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.
A. Not a concern
B. Not mentioned in the specifications
C. Endangered by excavation operations
D. None of the above

95. In situations where sidewalks, pavement and appurtenant structures may be undermined, a support system such as shoring must be provided to protect _____ from the possible collapse of such structures.
A. Unauthorized persons
B. Employees
C. Vehicles
D. None of the above

Personnel Protective Systems

96. According to the text, employees in _____ shall be protected from cave-ins by an adequate protective system, which shall be inspected by a competent person.
A. Excavations
B. Vehicles
C. Protective systems
D. None of the above

97. The use of _____ is required for all excavations deeper than five (5') feet, except when excavation is within stable rock.
A. Tables
B. Tabulated data
C. Protective systems
D. None of the above

98. For trench excavations less than five (5') feet deep, the use of _____ may not be required unless there is evidence of a potential cave-in. The competent person shall make this determination.
A. Ladders
B. Protective systems
C. Ramps
D. None of the above

99. Requirements for sloping, benching or protective systems are found in _____.
A. Safety Manuals
B. Tabulated data
C. CFR 1926.652 (OSHA Construction Standards)
D. None of the above

(S) Means the answer can be plural or singular in nature

100. Whenever support systems, _____, or other protective systems are being used, a written copy of the manufacturer's specifications, recommendations, and limitations sheet shall be available at the job site.
A. Shield systems C. Ramps
B. Tabulated data D. None of the above

Excavation Protection Systems
101. There are three basic protective systems for excavations and trenches. They are sloping and benching systems, _____, and shields.
A. Shoring C. Attendants
B. Ramps D. None of the above

Inspections
102. The excavations, adjacent areas, and protective systems shall be inspected daily by the _____.
A. Contractor C. Competent person
B. Employees D. None of the above

Water Quality Section

Three Types of Public Water Systems
103. Provides water to the same population year-round for example: homes, apartment buildings.
A. TNCWS C. NTNCWSs
B. CWSs D. None of the above

104. Approximately 85,000 systems
A. TNCWS C. NTNCWSs
B. CWSs D. None of the above

Managing Water Quality at the Source
105. Contingent upon the region, source water may have several restrictions of use as part of a Water Shed Management Plan. In some areas, it may be restricted from recreational use, discharge or runoff from agriculture, or_____ .
A. Excess nutrients C. Industrial and wastewater discharge
B. Biological actions D. None of the above

Physical Characteristics of Water
106. Physical characteristics are the elements found that are considered alkali, metals, and non-metals such as carbonates, fluoride,_____. The consumer relates it to scaling of faucets or staining.
A. pH and alkalinity C. Powdered activated carbon and chlorine
B. Sulfides or acids D. None of the above

Turbidity Introduction
107. One physical feature of water is turbidity. A measure of the cloudiness of water caused by_____. The cloudy appearance of water caused by the presence of tiny particles.
A. Suspended particles C. Temperature fluctuation
B. Variations D. None of the above

(S) Means the answer can be plural or singular in nature

pH Testing Section

108. When an atom loses _____and thus has more protons than electrons, the atom is a positively-charged ion or cation.

A. A proton C. An electron
B. Charge D. None of the above

109. Pure water has a pH very close to?

A. 7 C. 7.7
B. 7.5 D. None of the above

110. Since pH is a logarithmic scale, a difference of one pH unit is equivalent to _____difference in hydrogen ion concentration

A. 1 C. 10
B. .1 D. None of the above

Objections to Hard Water

Scale Formation

111. Hard water forms scale, usually_____, which causes a variety of problems. Left to dry on the surface of glassware and plumbing fixtures, including showers doors, faucets, and sink tops; hard water leaves unsightly white scale known as water spots.

A. Magnesium carbonate C. Calcite
B. Calcium carbonate D. None of the above

What are Disinfection Byproducts (DBPs)?

112. Which of the following form when disinfectants used to treat drinking water react with naturally occurring materials in the water?

A. Chloramines C. Disinfection byproducts (DBPs)
B. Humic and fulvic acids D. None of the above

Disinfection Byproduct Research and Regulations Summary

113. _____is unquestionably the most important step in the treatment of water for drinking water supplies.

A. DBP(s) C. Disinfection
B. Turbidity (particle) D. None of the above

Bacteriological Monitoring Section

Contaminants that may be present in sources of drinking water include:

114. Which of the following like salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming?

A. Radioactive contaminants C. Inorganic contaminants
B. Pesticides and herbicides D. Microbial contaminants

Background

115. Coliform bacteria and chlorine residual are the only routine sampling and monitoring requirements for small ground water systems with chlorination. The coliform bacteriological sampling is governed by the Coliform Reduction amendment of the SDWA.

A. True B. False

(S) Means the answer can be plural or singular in nature

TCR

116. The TCR recommends most of the Public Water Systems (PWS) to monitor their distribution system for bacteria according to the written sample sitting plan for that system.
A. True B. False

117. Coliform contamination may occur anywhere in the system, possibly due to problems such as; high-pressure conditions, line fluctuations, or wells, and therefore routine monitoring is required.
A. True B. False

Routine Sampling Requirements

118. Total coliform samples must be collected by PWSs at sites which are representative of water quality throughout the distribution system according to a written sample siting plan subject to state review and revision.
A. True B. False

119. For PWSs collecting more than one sample per month, collect total coliform samples at regular intervals throughout the month, except that ground water systems serving 4,900 or fewer people may collect all required samples on a single day if the samples are taken from different sites.
A. True B. False

120. Each total coliform-positive (TC+) routine sample must be tested for the presence of heterotrophic bacteria.
A. True B. False

121. If any TC+ sample is also E. coli-positive (EC+), then the EC+ sample result must be reported to the state by the end of the month that the PWS is notified.
A. True B. False

122. If any routine sample is TC+, repeat samples are required. – PWSs on quarterly or annual monitoring must take a minimum of one additional routine samples (known as additional routine monitoring) the quarter following a TC+ routine or repeat sample.
A. True B. False

123. Reduced monitoring is general available for PWSs using only surface water and serving 1,000 or fewer persons that meet certain additional PWS criteria.
A. True B. False

Dangerous Waterborne Microbes

124. Which of the following is a parasite that enters lakes and rivers through sewage and animal waste. It causes cryptosporidiosis, a mild gastrointestinal disease. The disease can be severe or fatal for people with severely weakened immune systems.
A. Coliform Bacteria C. Giardia lamblia
B. Cryptosporidium D. None of the above

125. Which of the following are not necessarily agents of disease, fecal coliform bacteria may indicate the presence of disease-carrying organisms, which live in the same environment as the fecal coliform bacteria.
A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

126. Which of the following is a parasite that enters lakes and rivers through sewage and animal waste. It causes gastrointestinal illness (e.g. diarrhea, vomiting, and cramps)?
A. Coliform Bacteria C. Protozoa
B. Cryptosporidium D. None of the above

127. Which of the following is a species of the rod-shaped bacterial genus Shigella?
A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

Bacteriological Monitoring Introduction
128. Which of the following are usually harmless, occur in high densities in their natural environment and are easily cultured in relatively simple bacteriological media?
A. Indicator bacteria C. Viruses
B. Amoebas D. None of the above

129. Indicators in common use today for routine monitoring of drinking water include total coliforms, fecal coliforms, and?
A. Cryptosporidium C. Escherichia coli (E. coli)
B. Protozoa D. None of the above

130. According to the text, the routine microbiological analysis of your water is for?
A. Contamination C. Coliform bacteria
B. Colloids D. None of the above

The three (3) primary types of samples are:
131. A PWS has a second Level 1 Assessment within a rolling 12-month period.
A. Trigger: Level 1 Assessment C. All of the above
B. Trigger: Level 2 Assessment D. None of the above

132. A PWS on state-approved annual monitoring has a Level 1 Assessment trigger in 2 consecutive years.
A. Trigger: Level 1 Assessment C. All of the above
B. Trigger: Level 2 Assessment D. None of the above

133. A PWS collecting fewer than 40 samples per month has 2 or more TC+ routine/ repeat samples in the same month.
A. Trigger: Level 1 Assessment C. All of the above
B. Trigger: Level 2 Assessment D. None of the above

134. A PWS fails to take every required repeat sample after any single TC+ sample
A. Trigger: Level 1 Assessment C. All of the above
B. Trigger: Level 2 Assessment D. None of the above

Heterotrophic Plate Count (Spread Plate Method)
135. Which of the following provides a technique to quantify the bacteriological activity of a sample?
A. Colonies C. Heterotrophic Plate Count
B. Agar D. None of the above

Total Coliforms
136. This MCL is based on the presence of total coliforms, and compliance is on a daily or weekly basis, depending on your water system type and state rule.
A. True B. False

137. For systems that collect fewer than _____ samples per month, no more than one sample per month may be positive. In other words, the second positive result (repeat or routine) in a month or quarter results in a MCL violation.
A. 40 C. 200
B. 100 D. None of the above

The following are acute violations:
138. Which determines a violation of nitrate?
A. Presence C. MCLG
B. MCL D. None of the above

Revised Total Coliform Rule (RTCR) Summary
139. EPA published the Revised Total Coliform Rule (RTCR) in the Federal Register (FR) on February 13, 2013 (78 FR 10269). It is the revision to the 1989 Total Coliform Rule (TCR).
A. True B. False

140. The RTCR upholds the purpose of the 1989 TCR to protect public health by ensuring the duplicity of the drinking water distribution system and monitoring for the absence of microbial contamination.
A. True B. False

141. The RTCR establishes criteria for systems to qualify for and stay on for special increased monitoring, which could reduce water system problems for better system operation.
A. True B. False

142. The water provider shall develop and follow a sample-siting plan that designates the PWS's collection schedule. This includes location of_____.
A. Routine and repeat water samples C. Microbial contamination
B. Reduced monitoring D. Repeat water samples

143. The water provider shall collect _____on a regular basis (monthly, quarterly, annually). Have samples tested for the presence of total coliforms by a state certified laboratory.
A. Routine water samples C. Microbial contamination
B. Reduced monitoring D. Repeat water samples

144. PN is required for violations incurred. Within required timeframes, the PWS must use the required health effects language and notify the public if they did not comply with certain requirements of the RTCR. The type of _____ depends on the severity of the violation.
A. CCR(s) C. MCL violation
B. PN D. TC+ routine or repeat sample

145. The RTCR requires public water systems that are vulnerable to microbial contamination to identify and fix problems.
A. True B. False

146. The water provider shall collect repeat samples (at least 3) for each TC+ positive routine sample.
A. True B. False

147. For PWSs on quarterly or annual routine sampling, collect additional routine samples (at least 3) in the month after a _____ .
A. CCR(s) C. Total coliform positive samples
B. PN D. TC+ routine or repeat sample

148. PWSs incur violations if they do not comply with the requirements of the RTCR. The violation types are essentially the same as under the TCR with few changes. The biggest change is no acute or monthly MCL violation for _____only.
A. CCR(s) C. Total coliform positive samples
B. PN D. TC+ routine or repeat sample

149. Community water systems (CWSs) must use specific language in their CCRs when they must conduct an assessment or if they incur_____.
A. CCR(s) C. An E. coli MCL violation
B. PN D. TC+ routine or repeat sample

Disinfection Key
150. The RTCR requires 99.99% or 4 log inactivation of _____ .
A. Enteric viruses C. Giardia lamblia cysts
B. Crypto D. None of the above

151. The RTCR requires 99% or 2 log inactivation of _____ .
A. Enteric viruses C. Giardia lamblia cysts
B. Crypto D. None of the above

152. The RTCR requires 99.9% or 3 log inactivation of _____.
A. Enteric viruses C. Giardia lamblia cysts
B. Crypto D. None of the above

Chain of Custody Procedures
153. If both parties involved in the transfer must sign, date and note the time on the chain of custody record, this is known as?
A. TC Plan C. Samples transfer possession
B. Sample siting plan D. None of the above

154. The recipient will then attach the _____showing the transfer dates and times to the custody sheets. If the samples are split and sent to more than one laboratory, prepare a separate chain of custody record for each sample.
A. Shipping invoices C. Sample siting plan
B. Chain of custody release D. None of the above

Disinfection Section

Chlorine's Appearance and Odor
155. Chlorine is a greenish-yellow gas it will condense to an amber liquid at approximately _____F or at high pressures.
A. -29.2 degrees C. 29 degrees
B. – 100 degrees D. None of the above

156. Prolonged exposures to chlorine gas may result in?
A. Moisture, steam, and water C. Olfactory fatigue
B. Odor thresholds D. None of the above

Chlorine Gas
Pathophysiology
157. As far as chlorine safety and respiratory protection, the intermediate _____of chlorine accounts for its effect on the upper airway and the lower respiratory tract.
A. Effects of Hydrochloric acid C. Water solubility
B. Vapor from Chlorine gas D. None of the above

158. Respiratory exposure to _____ may be prolonged because its moderate water solubility may not cause upper airway symptoms for several minutes.
A. Hydrochloric acid C. Plasma exudation
B. Chlorine gas D. None of the above

159. The odor threshold for chlorine gas is approximately?
A. 0.3-0.5 parts per million (ppm) C. 3-5 parts per million (ppm)
B. 3 parts per million (ppm) D. None of the above

Mechanism of Activity
160. Chlorine gas feeds out of the cylinder through a gas regulator. The cylinders are on a scale that operators use to measure the amount used each day. The chains are used to prevent the tanks from falling over.
A. True B. False

Early Response to Chlorine Gas
161. If you mix ammonia with chlorine gas, this compound reacts to form_____.
A. Chloramine gas C. Sulfuric gas
B. Chlorine gas D. None of the above

Reactivity
162. Cylinders of chlorine may burst when exposed to elevated temperatures. When there is Chlorine in solution, this forms?
A. Hydrogen sulfide C. A corrosive material
B. Oxomonosilane D. None of the above

163. What is formed when chlorine is in contact with combustible substances (such as gasoline and petroleum products, hydrocarbons, turpentine, alcohols, acetylene, hydrogen, ammonia, and sulfur), reducing agents, and finely divided metals?
A. Fires and explosions C. Moisture, steam, and water
B. Odor thresholds D. None of the above

164. Contact between chlorine and arsenic, bismuth, boron, calcium, activated carbon, carbon disulfide, glycerol, hydrazine, iodine, methane, oxomonosilane, potassium, propylene, and silicon should be avoided.
A. True B. False

165. Chlorine reacts with hydrogen sulfide and water to form this substance?
A. Hydrogen sulfide C. Chlorinates
B. Hydrochloric acid D. None of the above

166. According to the text, chlorine is also incompatible with?
A. Plastic C. Moisture, steam, and water
B. Palladium D. None of the above

Flammability

167. When there is a fire that involves Chlorine, the firefight should be fought downwind from the minimum distance possible.
A. True B. False

168. Keep unnecessary people away; isolate the hazard area and deny entry. For a massive fire in a cargo area, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from the area and let the fire burn. Emergency personnel should stay out of low areas and Ventilate closed spaces before entering.
A. True B. False

169. The effectiveness of chlorination depends on the _____ of the water, the concentration of the chlorine solution added, the time that chlorine is in contact with the organism, and water quality.
A. Chlorine residual C. Oxygen
B. Chlorine demand D. None of the above

170. Chlorine may not be available for disinfection because _____ in the water (like iron, manganese, hydrogen sulfide, and ammonia).
A. pH increases C. Required contact time
B. Part of it combines with other chemicals D. None of the above

171. The amount of chlorine required to achieve disinfection and that reacts with the other chemicals is the?
A. Chlorine residual C. Free chlorine residual
B. Chlorine demand D. None of the above

172. Which term is used when disinfection decreases, as the concentration of the chlorine increases?
A. pH increases C. Required contact time
B. Chlorine level and water quality D. None of the above

173. Chlorination is more effective as?
A. Water temperature increases C. Water cools down
B. Chlorine demand D. None of the above

174. Chlorination becomes more alkaline and is less effective as the?
A. Water's pH increases C. Required contact time is maximized
B. Water quality increases D. None of the above

175. Chlorination is less effective in?
A. Clear water C. Day time
B. Cloudy (turbid) water D. None of the above

176. By adding a little more chlorine to what is already sufficient, this action will generally result in _____that can be measured easily.
A. pH increases C. Required contact time
B. A free chlorine residual D. None of the above

Chlorination Chemistry

177. The hypochlorite ion is a much weaker disinfecting agent than Hypochlorous acid, about 100 times less effective.
A. True B. False

178. According to the text, pH and temperature affect the ratio of hypochlorous acid to hypochlorite ions. As the temperature is decreased, the _____ increases.
A. Reduction Ratio C. "CT" disinfection concept
B. Ratio of hypochlorous acid D. None of the above

179. Under normal water conditions, hypochlorous acid will also chemically react and break down into the hypochlorite ion.
A. True B. False

180. Although the ratio of _____ is greater at lower temperatures, pathogenic organisms are actually harder to kill.
A. Hypochlorous acid C. Total chlorine
B. The amount of chlorine D. None of the above

181. If all other things were equal, _____ and a lower pH are more conducive to chlorine disinfection.
A. Lower pH C. Higher water temperatures
B. Hypochlorous acid D. None of the above

182. All three forms of chlorine produce Sodium hypochlorite when added to water.
A. True B. False

183. Hypochlorous acid is a strong acid but a weak disinfecting agent. The amount of hypochlorous acid depends on the pH and temperature of the water.
A. True B. False

Chlorine DDBP

184. These term means that chlorine is present as Cl, HOCl, and OCl^- is called _____, and that which is bound but still effective is _____.
A. Free available chlorine and Total
B. Free and Residual
C. Free available chlorine and Combined Chlorine
D. None of the above

185. Chloramines are formed by reactions with?
A. Acid and Cl_2 C. Folic Acid and Cl2
B. Ammonia and Cl_2 D. None of the above

Types of Residual

186. Which of the following is all chlorine that is available for disinfection?
A. Chlorine residual C. Total chlorine
B. Chlorine demand D. None of the above

Chlorine Exposure Limits

187. What is OSHA's PEL?

A. 10 PPM C. 1,000 PPM
B. 1 PPM D. None of the above

188. Chlorine's Physical and chemical properties: A yellowish green, nonflammable and liquefied gas with an unpleasant and irritating smell.

A. True B. False

189. Liquid chlorine is about _____ times heavier than water

A. 1.5 C. 2.5
B. 10 D. None of the above

190. Gaseous chlorine is about _____ times heavier than air.

A. 1.5 C. 2.5
B. 10 D. None of the above

Alternate Disinfectants - Chloramine

191. It is recommended that Chloramine be used in conjunction with a stronger disinfectant. It is best utilized as a?

A. Chloramine C. Stable distribution system disinfectant
B. T10 value disinfectant D. None of the above

192. In the production of _____, the ammonia residuals in the finished water, when fed in excess of stoichiometric amount needed, should be limited to inhibit growth of nitrifying bacteria.

A. Dry sodium chlorite C. Ammonia residual(s)
B. Chloramines D. None of the above

Chlorine Dioxide

193. Which term provides good Giardia and virus protection but its use is limited by the restriction on the maximum residual of 0.5 mg/L ClO_2/chlorite/chlorate allowed in finished water?

A. Chlorinated byproducts C. Ammonia residual(s)
B. Chlorine dioxide D. None of the above

194. If chlorine dioxide is being used as an oxidant, the preferred method of generation is to entrain or _____ into a packed reaction chamber with a 25% aqueous solution of sodium chlorite ($NaClO_2$).

A. Chloramine C. Chlorine dioxide
B. Chlorine gas D. None of the above

195. Which chemical is explosive and can cause fires in feed equipment if leaking solutions or spills are allowed to dry out?

A. Dry sodium chlorite C. Ammonia
B. Chlorine dioxide D. None of the above

196. Chlorine dioxide may be used for either taste or odor control or as a?

A. Chloramine D. Gas
B. Pre-disinfectant D. None of the above

197. Total residual oxidants (including chlorine dioxide and chlorite, but excluding Chlorine dioxide) shall not exceed 0.50 mg/L during normal operation or 0.30 mg/L (including chlorine dioxide, chlorite and chlorate) during periods of extreme variations in the raw water supply.
A. True B. False

Ozone

198. When determining Ozone CT (contact time) values must be determined for the ozone basin alone; an accurate _____ must be obtained for the contact chamber, and residual levels.
A. Residual C. Contact time
B. T10 value D. None of the above

199. Ozone does not provide a system residual and should be used as a primary disinfectant only in conjunction with?
A. Dry sodium chlorite C. Free and/or combined chlorine
B. Chlorine dioxide D. None of the above

200. Ozone does not produce chlorinated byproducts (such as trihalomethanes) but it may cause an increase in such byproduct formation if it is fed ahead of free chlorine; ozone may also produce its own oxygenated byproducts such as Cl_2 + NH_4.
A. True B. False

When Finished with Your Assignment

REQUIRED DOCUMENTS

Please scan the **Registration Page, Answer Key, Survey and Driver's License** and email it to info@TLCH2O.com.

IPhone Scanning Instructions

If you are unable to scan, take a photo of these documents with your **iPhone** and send these photos to TLC, info@TLCH2O.com.

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