

Registration form

DISTRIBUTION BASICS CEU 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

Name _____ **Signature** _____

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

Address: _____

City _____ **State** _____ **Zip** _____

Email _____ **Fax ()** _____

Phone:
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
PO Box 420, Payson AZ 85547-0420
(928) 468-0665 Fax (928) 272-0747 Fax Back-up (928) 468-0675
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Discover card _____ **CCV code on card** _____
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We will stop mailing the certificate of completion so we need your e-mail address. We will e-mail the certificate to you, if no e-mail address; we will mail it to you.

DISCLAIMER NOTICE

I understand that it is my responsibility to ensure that this CEU course is either approved or accepted in my State for CEU credit. I understand State laws and rules change on a frequent basis and I believe this course is currently accepted in my State for CEU or contact hour credit, if it is not, I will not hold Technical Learning College responsible. I also understand that this type of study program deals with dangerous conditions and that I will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable for any errors or omissions or advice contained in this CEU education training course or for any violation or injury caused by this CEU education training course material. I will call or contact TLC if I need help or assistance and double-check to ensure my registration page and assignment has been received and graded.

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...

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You can obtain a printed version of the course manual from TLC for an additional \$79.95 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...

Distribution Answer Key

Name _____

Phone # _____

Please Circle, Underline, or X or in Word, highlight or bold.

- | | | | |
|-----------|-----------|------------|------------|
| 1. ABCDE | 39. ABCDE | 77. ABCDE | 115. ABCDE |
| 2. ABCDE | 40. ABCDE | 78. ABCDE | 116. ABCDE |
| 3. ABCDE | 41. ABCDE | 79. ABCDE | 117. ABCDE |
| 4. ABCDE | 42. ABCDE | 80. ABCDE | 118. ABCDE |
| 5. ABCDE | 43. ABCDE | 81. ABCDE | 119. ABCDE |
| 6. ABCDE | 44. ABCDE | 82. ABCDE | 120. ABCDE |
| 7. ABCDE | 45. ABCDE | 83. ABCDE | 121. ABCDE |
| 8. ABCDE | 46. ABCDE | 84. ABCDE | 122. ABCDE |
| 9. ABCDE | 47. ABCDE | 85. ABCDE | 123. ABCDE |
| 10. ABCDE | 48. ABCDE | 86. ABCDE | 124. ABCDE |
| 11. ABCDE | 49. ABCDE | 87. ABCDE | 125. ABCDE |
| 12. ABCDE | 50. ABCDE | 88. ABCDE | 126. ABCDE |
| 13. ABCDE | 51. ABCDE | 89. ABCDE | 127. ABCDE |
| 14. ABCDE | 52. ABCDE | 90. ABCDE | 128. ABCDE |
| 15. ABCDE | 53. ABCDE | 91. ABCDE | 129. ABCDE |
| 16. ABCDE | 54. ABCDE | 92. ABCDE | 130. ABCDE |
| 17. ABCDE | 55. ABCDE | 93. ABCDE | 131. ABCDE |
| 18. ABCDE | 56. ABCDE | 94. ABCDE | 132. ABCDE |
| 19. ABCDE | 57. ABCDE | 95. ABCDE | 133. ABCDE |
| 20. ABCDE | 58. ABCDE | 96. ABCDE | 134. ABCDE |
| 21. ABCDE | 59. ABCDE | 97. ABCDE | 135. ABCDE |
| 22. ABCDE | 60. ABCDE | 98. ABCDE | 136. ABCDE |
| 23. ABCDE | 61. ABCDE | 99. ABCDE | 137. ABCDE |
| 24. ABCDE | 62. ABCDE | 100. ABCDE | 138. ABCDE |
| 25. ABCDE | 63. ABCDE | 101. ABCDE | 139. ABCDE |
| 26. ABCDE | 64. ABCDE | 102. ABCDE | 140. ABCDE |
| 27. ABCDE | 65. ABCDE | 103. ABCDE | 141. ABCDE |
| 28. ABCDE | 66. ABCDE | 104. ABCDE | 142. ABCDE |
| 29. ABCDE | 67. ABCDE | 105. ABCDE | 143. ABCDE |
| 30. ABCDE | 68. ABCDE | 106. ABCDE | 144. ABCDE |
| 31. ABCDE | 69. ABCDE | 107. ABCDE | 145. ABCDE |
| 32. ABCDE | 70. ABCDE | 108. ABCDE | 146. ABCDE |
| 33. ABCDE | 71. ABCDE | 109. ABCDE | 147. ABCDE |
| 34. ABCDE | 72. ABCDE | 110. ABCDE | 148. ABCDE |
| 35. ABCDE | 73. ABCDE | 111. ABCDE | 149. ABCDE |
| 36. ABCDE | 74. ABCDE | 112. ABCDE | 150. ABCDE |
| 37. ABCDE | 75. ABCDE | 113. ABCDE | |
| 38. ABCDE | 76. ABCDE | 114. ABCDE | |

Please fax the answer key to TLC Western Campus Fax (928) 272-0747.

Rush Grading Service

If you need this assignment graded and the results mailed to you within a 48-hour period, prepare to pay an additional rush serve handling fee of \$50.00. This fee may not cover postage costs. If you need this service, simply write RUSH on the top of your Registration Form. We will place you in the front of the grading and processing line.

Call us a couple hours after faxing to ensure that we received your paperwork.

Please e-mail or fax this survey along with your final exam

**Distribution Basics CEU Training Course
CUSTOMER SERVICE RESPONSE CARD**

NAME: _____

E-MAIL _____ PHONE _____

PLEASE COMPLETE THIS FORM BY CIRCLING THE NUMBER OF THE APPROPRIATE ANSWER IN THE AREA BELOW.

1. Please rate the difficulty of your course.

Very Easy 0 1 2 3 4 5 Very Difficult

2. Please rate the difficulty of the testing process.

Very Easy 0 1 2 3 4 5 Very Difficult

3. Please rate the subject matter on the exam to your actual field or work.

Very Similar 0 1 2 3 4 5 Very Different

4. How did you hear about this Course? _____

How about the price of the course?

Poor _____ Fair _____ Average _____ Good _____ Great _____

How was your customer service?

Poor _____ Fair _____ Average _____ Good _____ Great _____

Any other concerns or comments.

Distribution Basics CEU Training Course Assignment

You will have 90 days in order to successfully complete this assignment with a score of 70% or better. If you need any assistance, please contact TLC's Student Services. Once you are finished, please, e-mail or fax your answer sheet along with your registration form.

Please use Answer key, one answer per question, there are no trick questions.

Contaminated Wells

1. Groundwater flows slowly through water-bearing formations (_____) at different rates. In some places, where groundwater has dissolved limestone to form caverns and large openings, its rate of flow can be relatively fast, but this is exceptional.
 - A. Unsaturated zone
 - B. Wells
 - C. Water table
 - D. Aquifers
 - E. None of the Above
2. Contaminated wells used for drinking water are especially dangerous. _____ can be tested to see what chemicals may be in the well and if they are present in dangerous quantities.
 - A. Unsaturated zone
 - B. Wells
 - C. Water table
 - D. Aquifers
 - E. None of the Above
3. _____ is withdrawn from wells to provide water for everything from drinking water for the home and business to water to irrigate crops to industrial processing water.
 - A. Unsaturated zone
 - B. Wells
 - C. Groundwater
 - D. Aquifers
 - E. None of the Above
4. When water is pumped from the ground, the dynamics of _____ flow change in response to this withdrawal.
 - A. Unsaturated zone
 - B. Wells
 - C. Water table
 - D. Groundwater
 - E. None of the Above
5. Examples of _____ aquifers include granite and basalt.
 - A. Limestone terrain
 - B. Karst
 - C. Fractured
 - D. Aquifers
 - E. None of the Above
6. Many terms are used to describe the nature and extent of the groundwater resource. The level below which all the spaces are filled with water is called the _____.
 - A. Unsaturated zone
 - B. Wells
 - C. Water table
 - D. Aquifers
 - E. None of the Above

7. Above the water table lies the _____. Here the spaces in the rock and soil contain both air and water. Water in this zone is called soil moisture.
- A. Unsaturated zone
 - B. Wells
 - C. Water table
 - D. Aquifers
 - E. None of the Above
8. The entire region below the water table is called the saturated zone and water in this saturated zone is called _____.
- A. Unsaturated zone
 - B. Wells
 - C. Groundwater
 - D. Aquifers
 - E. None of the Above
9. _____ aquifers are rocks in which the groundwater moves through cracks, joints or fractures in otherwise solid rock.
- A. Limestone terrain
 - B. Karst
 - C. Fractured
 - D. Aquifers
 - E. None of the Above
10. Limestones are often fractured aquifers, but here the cracks and _____ may be enlarged by solution, forming large channels or even caverns.
- A. Limestone terrain
 - B. Karst
 - C. Fractures
 - D. Aquifers
 - E. None of the Above
11. Limestone terrain where solution has been very active is termed _____.
- A. Limestone terrain
 - B. Karst
 - C. Fractured
 - D. Aquifers
12. Porous media such as sandstone may become so highly cemented or recrystallized that all of the _____ is filled. In this case, the rock is no longer a porous medium.
- A. Limestone terrain
 - B. Karst
 - C. Fractured
 - D. Aquifers
 - E. None of the Above
13. If it contains _____ it can still act as a fractured aquifer.
- A. Limestone terrain
 - B. Karst
 - C. Fractured
 - D. Aquifers
 - E. None of the Above

14. Most of the _____ of importance to us are unconsolidated porous media such as sand and gravel.
- A. Groundwater
 - B. Aquifers
 - C. Unconfined aquifers
 - D. Not permeable
 - E. None of the Above
15. Some very porous materials are _____. Clay, for instance, has many spaces between its grains, but the spaces are not large enough to permit free movement of water.
- A. Groundwater
 - B. Aquifers
 - C. Unconfined aquifers
 - D. Not permeable
 - E. None of the Above
16. _____ usually flows downhill with the slope of the water table. Like surface water, groundwater flows toward, and eventually drains into, streams, rivers, lakes and the oceans.
- A. Groundwater
 - B. Aquifers
 - C. Unconfined aquifers
 - D. Not permeable
 - E. None of the Above
17. Groundwater flow in the _____ underlying surface drainage basins, however, does not always mirror the flow of water on the surface.
- A. Groundwater
 - B. Aquifers
 - C. Unconfined aquifers
 - D. Not permeable
 - E. None of the Above
18. Therefore, _____ may move in different directions below the ground than the water flowing on the surface.
- A. Groundwater
 - B. Aquifers
 - C. Unconfined aquifers
 - D. Not permeable
 - E. None of the Above
19. _____ are those that are bounded by the water table.
- A. Groundwater
 - B. Aquifers
 - C. Unconfined aquifers
 - D. Not permeable
 - E. None of the Above
20. Some aquifers, however, lie beneath layers of impermeable materials. These are called confined aquifers, or sometimes _____.
- A. Groundwater
 - B. Aquifers
 - C. Artesian aquifer
 - D. Artesian well
 - E. None of the Above

21. A well in such an aquifer is called an _____. The water in these wells rises higher than the top of the aquifer because of confining pressure.
- A. Groundwater
 - B. Aquifers
 - C. Artesian aquifer
 - D. Artesian well
 - E. None of the Above
22. If the water level rises above the ground surface a flowing _____ occurs.
- A. Groundwater
 - B. Aquifers
 - C. Artesian aquifer
 - D. Artesian well
 - E. None of the Above
23. The piezometric surface is the level to which the water in an _____ will rise.
- A. Groundwater
 - B. Aquifers
 - C. Artesian aquifer
 - D. Artesian well
 - E. None of the Above
24. When pumping begins, water begins to flow towards the well in contrast to the natural direction of _____ movement.
- A. Groundwater
 - B. Aquifers
 - C. Artesian aquifer
 - D. Artesian well
 - E. None of the Above
25. The water level in the well falls below the water table in the surrounding aquifer. As a result, water begins to move from the _____ into the well.
- A. Groundwater
 - B. Aquifer
 - C. Cone of depression
 - D. Artesian well
 - E. None of the Above
26. As pumping continues, the water level in the well continues to increase until the rate of flow into the _____ equals the rate of withdrawal from pumping.
- A. Groundwater
 - B. Aquifer
 - C. Artesian aquifer
 - D. Drawdown
 - E. None of the Above
27. The movement of water from an aquifer into a well results in the formation of a _____.
- A. Groundwater
 - B. Aquifer
 - C. Artesian aquifer
 - D. Drawdown
 - E. None of the Above

28. The _____ describes a three-dimensional inverted cone surrounding the well that represents the volume of water removed as a result of pumping.
- Groundwater
 - Aquifer
 - Artesian aquifer
 - Drawdown
 - None of the Above
29. _____ is the vertical drop in the height between the water level in the well prior to pumping and the water level in the well during pumping.
- Groundwater
 - Aquifer
 - Artesian aquifer
 - Drawdown
 - None of the Above
30. When a well is installed in an unconfined aquifer, water moves from the _____ into the well through small holes or slits in the well casing or, in some types of wells, through the open bottom of the well.
- Groundwater
 - Aquifer
 - Artesian aquifer
 - Drawdown
 - None of the Above
31. The level of the water in the well is the same as the water level in the _____. Groundwater continues to flow through and around the well in one direction in response to gravity.
- Groundwater
 - Aquifer
 - Artesian aquifer
 - Drawdown
 - None of the Above
32. The quantity of water _____ varies from 50 to 500 gallons per person per day.
- Be capable of meeting consumers' needs
 - Represent a rather significant
 - Used in any community
 - Design assumption is to use
 - None of the Above
33. A common _____ from 100 to 150 gallons per person per day for average domestic use.
- Be capable of meeting consumers' needs
 - Represent a rather significant
 - Used in any community
 - Design assumption is to use
 - None of the Above
34. The maximum daily use is approximately 2 to 3 times the average daily use. Maximum daily use is usually encountered during the summer months and _____ on irrigation practices.
- Be capable of meeting consumers' needs
 - Can vary widely depending
 - Used in any community
 - Design assumption is to use
 - None of the Above

35. Water system demand comes from a number of sources including residential, commercial, industrial and public consumers as well as some unavoidable loss and waste. If fire protection is desired, that could also _____ (although not continuous) demand upon the system.

- A. Be capable of meeting consumers' needs
- B. Represent a rather significant
- C. Used in any community
- D. Design assumption is to use
- E. None of the Above

36. The combination of storage reservoirs and distribution lines must be _____ for quality, quantity and pressure at all times.

- A. Be capable of meeting consumers' needs
- B. Represent a rather significant
- C. Used in any community
- D. Design assumption is to use
- E. None of the Above

Water Pressure

37. For ordinary domestic use, water pressure should be between ____ and 45 psi.

- A. 20
- B. 25
- C. 75
- D. 2.31
- E. None of the Above

38. A minimum of 60 psi at a fire hydrant is usually adequate, since that allows for up to ____ psi pressure drop in fire hoses.

- A. 20
- B. 25
- C. 75
- D. 2.31
- E. None of the Above

39. In commercial and industrial districts, it may be common to have ____ psi or higher.

- A. 20
- B. 25
- C. 75
- D. 2.31
- E. None of the Above

40. ____ is considered the minimum required at any point in the water system, so that backflow and infiltration is prevented.

- A. 20
- B. 25
- C. 75
- D. 2.31
- E. None of the Above

41. Pressure is provided by the direct force of the water (such as water from a pump), or by the height of the water (such as a storage reservoir). ____ 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. 20
- B. 25
- C. 75
- D. 2.31
- E. None of the Above

42. The cost of supplying water to the users of any water system includes the installation of ____ and distribution facilities.

- A. Joints
- B. Facilities
- C. Source
- D. Foreign material
- E. None of the Above

43. There are _____ associated with cleaning, repairing and replacing these facilities.

- A. Joints
- B. Facilities
- C. Source
- D. Foreign material
- E. None of the Above

44. The distribution system must also protect water quality between the _____ and the customer's tap.

- A. Joints
- B. Facilities
- C. Source
- D. Foreign material
- E. None of the Above

45. _____ is important in maintaining system integrity. Care must be taken that no foreign material is introduced into the system during pipe laying operations.

- A. Joints
- B. Facilities
- C. Proper construction
- D. Foreign material
- E. None of the Above

46. _____ should be covered at the end of the work day or during interruptions of construction.

- A. Joints
- B. Facilities
- C. Pipe ends
- D. Foreign material
- E. None of the Above

47. All pipes, joints and fittings should be pressure tested and disinfected with a 5% chlorine solution such as _____ before backfilling.

- A. Joints
- B. Facilities
- C. Source
- D. Foreign material
- E. None of the Above

Water Storage Facilities

48. _____ and tanks vary in size, shape, and application.

- A. Energy
- B. Water storage facilities
- C. Release
- D. Tanks
- E. None of the Above

49. There are different types that are used in the water distribution systems, such as stand pipes, _____ and reservoirs, hydropneumatic tanks and surge tanks.
- A. Energy
 - B. Water Hammer
 - C. Elevated tanks
 - D. Tanks
 - E. None of the Above
50. These tanks serve _____ in the distribution system. Just the name alone can give you an idea of its purpose.
- A. Energy
 - B. Water Hammer
 - C. Multiple purposes
 - D. Tanks
 - E. None of the Above
51. What really causes water main breaks - _____ - when released in a confined space, such as a water distribution system.
- A. Energy
 - B. Water Hammer
 - C. Release
 - D. Tanks
 - E. None of the Above
52. _____ are created when hydrants, valves, or pumps are opened and closed quickly, trapping the kinetic energy of moving water within the confined space of a piping system.
- A. Energy
 - B. Water Hammer
 - C. Release
 - D. Shock waves
 - E. None of the Above
53. These _____ can create a turbulence that travels at the speed of sound, seeking a point of release.
- A. Energy
 - B. Water Hammer
 - C. Release
 - D. Shock waves
 - E. None of the Above
54. The release the surge usually finds is an elevated tank, but the surge doesn't always find this _____ quickly enough.
- A. Energy
 - B. Water Hammer
 - C. Release
 - D. Shock waves
 - E. None of the Above
55. Something has to give, and oftentimes, it's your pipe fittings. Distribution operators are aware of this phenomenon! It's called _____.
- A. Energy
 - B. Water Hammer
 - C. Release
 - D. Shock waves
 - E. None of the Above

56. This banging can be heard as _____.
- A. Energy
 - B. Water Hammer
 - C. Release
 - D. Shock waves
 - E. None of the Above
57. The definition of ' _____ ' is 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
 - B. Reverse
 - C. Relief valve
 - D. Maximum time period
 - E. None of the Above
58. To _____ the natural and normal directional flow of a liquid, gases, or solid substances back in to the public potable (drinking) water supply. This is normally an undesirable effect.
- A. Backflow
 - B. Reverse
 - C. Relief valve
 - D. Maximum time period
 - E. None of the Above
59. The difference between a reduced pressure principle backflow device and a double check backflow device is that RP has a _____.
- A. Backflow
 - B. Reverse
 - C. Relief valve
 - D. Maximum time period
 - E. None of the Above
60. 1 year is the _____ between having a backflow device tested by a certified backflow tester.
- A. Backflow
 - B. Reverse
 - C. Relief valve
 - D. Maximum time period
 - E. None of the Above
61. A _____ should not be used for water storage.
- A. Cross-connection
 - B. Surge tank
 - C. Volume of storage
 - D. Meet the fluctuations
 - E. None of the Above
62. The goal of the water tower or stand pipe is to store water high in the air, where it has lots of gravitational potential energy. This _____ to pressure potential energy or kinetic energy for delivery to homes.
- A. Cross-connection
 - B. Stored energy can be converted
 - C. Volume of storage
 - D. Meet the fluctuations
 - E. None of the Above

63. Since height is everything, _____ a cylindrical water tower is inefficient. Most of the water is then near the ground. By making the tower wider near the top, it puts most of its water high up.
- A. Cross-connection
 - B. Building
 - C. Volume of storage
 - D. Meet the fluctuations
 - E. None of the Above
64. Storage reservoirs allow the system to _____ in demand.
- A. Cross-connection
 - B. Flow by gravity
 - C. Volume of storage
 - D. Meet the fluctuations
 - E. None of the Above
65. It is recommended that the _____ be equal to from one to three days of the system's average daily use.
- A. Cross-connection
 - B. Flow by gravity
 - C. Volume of storage
 - D. Meet the fluctuations
 - E. None of the Above
66. It is also recommended that storage reservoirs be located at a high enough elevation to allow the water to _____ to the distribution system.
- A. Cross-connection
 - B. Flow by gravity
 - C. Volume of storage
 - D. Meet the fluctuations
 - E. None of the Above
67. This, coupled with restricted usage on the part of the consumers, should provide an uninterrupted water supply in the event of pump failure, loss of power or an acute contamination event or _____.
- A. Cross-connection
 - B. Flow by gravity
 - C. Volume of storage
 - D. Meet the fluctuations
 - E. None of the Above
68. _____ are also used as detention basins to provide the required chlorine contact time necessary to ensure adequate disinfection.
- A. Cathodic protection
 - B. Repainted
 - C. Reservoirs
 - D. Baffles
 - E. None of the Above
69. As such, the contact time in a reservoir is greatly improved when the reservoir is constructed with a _____, preferably located on opposite sides of the reservoir and at different levels.
- A. Cathodic protection
 - B. Repainted
 - C. Separate inlet and outlet pipe
 - D. Baffles
 - E. None of the Above

70. Also, _____ inside the reservoir (walls, curtains, or spirals) increase the contact time by preventing the water from leaving the reservoir too quickly (known as “short-circuiting”).
- A. Cathodic protection
 - B. Repainted
 - C. Steel reservoirs
 - D. Baffles
 - E. None of the Above
71. _____ or tanks generally have lower construction and installation costs than concrete, but require more maintenance.
- A. Cathodic protection
 - B. Repainted
 - C. Steel reservoirs
 - D. Baffles
 - E. None of the Above
72. To protect against corrosion, the _____ should be kept cleaned and painted.
- A. Coal-tar linings
 - B. Exterior
 - C. Steel reservoirs
 - D. Baffles
 - E. None of the Above
73. Interiors of steel reservoirs are commonly coated with an _____ finish.
- A. Coal-tar linings
 - B. Exterior
 - C. Steel reservoirs
 - D. Baffles
 - E. None of the Above
74. Some _____ used in the past have apparently degraded over time and are implicated in the release of small amounts of solvents into the stored water.
- A. Coal-tar linings
 - B. Exterior
 - C. Steel reservoirs
 - D. Baffles
 - E. None of the Above
75. _____ are usually welded or bolted together and are manufactured in a variety of sizes.
- A. Coal-tar linings
 - B. Exterior
 - C. Steel reservoirs
 - D. Baffles
 - E. None of the Above
76. Small _____ can be manufactured off-site and then trucked and lifted into place.
- A. Coal-tar linings
 - B. Exterior
 - C. Steel reservoirs
 - D. Baffles
 - E. None of the Above
77. Steel tanks should be inspected once a year and _____ every 5-7 years.
- A. Cathodic protection
 - B. Repainted
 - C. Steel reservoirs
 - D. None of the Above

78. Steel tanks should also have _____ and be screened to keep birds and insects out.

- A. Cathodic protection
- B. Repainted
- C. Steel reservoirs
- D. Baffles
- E. None of the Above

79. The maintenance program for reservoir tanks should call for _____ for a complete inspection of the interior.

- A. Inspection
- B. Repainted
- C. Steel reservoirs
- D. Baffles
- E. None of the Above

80. Cleaning and disinfection prior to placing the reservoir or tank back in _____ is necessary

- A. Cathodic protection
- B. Repainted
- C. Cleaning and disinfection
- D. Baffles
- E. None of the Above

System Elements

81. The elements of a water distribution system include distribution mains, arterial mains, storage reservoirs, and _____ system accessories.

- A. Storage reservoirs
- B. System accessories
- C. Arterial mains
- D. Hydropneumatic tank
- E. None of the Above

82. _____ are the pipelines that make up the distribution system. Their function is to carry water from the water source or treatment works to users.

- A. Storage reservoirs
- B. Distribution mains
- C. Arterial mains
- D. Hydropneumatic tank
- E. None of the Above

83. _____ are distribution mains of large size. They are interconnected with smaller distribution mains to form a complete gridiron system.

- A. Storage reservoirs
- B. Distribution mains
- C. Arterial mains
- D. Hydropneumatic tank
- E. None of the Above

84. _____ are structures used to store water. They also equalize the supply or pressure in the distribution system.

- A. Storage reservoirs
- B. Distribution mains
- C. Arterial mains
- D. Hydropneumatic tank
- E. None of the Above

85. A common example of a _____ is an aboveground water storage tank.
- A. Storage reservoirs
 - B. Distribution mains
 - C. Arterial mains
 - D. Hydropneumatic tank
 - E. None of the Above
86. The purpose of a _____ is to provide air for the water system.
- A. Storage reservoirs
 - B. Distribution mains
 - C. Arterial mains
 - D. Hydropneumatic tank
 - E. None of the Above
87. _____ are used to increase water pressure from storage tanks for low-pressure mains.
- A. Treelike system
 - B. Booster stations
 - C. Arterial mains
 - D. Regulating system
 - E. None of the Above
88. _____ control the flow of water in the distribution system by isolating areas for repair or by regulating system flow or pressure.
- A. Treelike system
 - B. Valves
 - C. Arterial mains
 - D. Regulating system
 - E. None of the Above
89. Older water systems frequently were expanded without planning and developed into _____.
- A. Treelike system
 - B. Booster stations
 - C. Arterial mains
 - D. Regulating system
 - E. None of the Above
90. This consists of a single _____ that decreases in size as it leaves the source and progresses through the area originally served.
- A. Treelike system
 - B. Booster stations
 - C. Main
 - D. Regulating system
91. Smaller pipelines branch off the main and divide again, much like the trunk and branches of a _____.
- A. Tree
 - B. Booster stations
 - C. Arterial mains
 - D. Regulating system
 - E. None of the Above

92. A _____ is not desirable because the size of the old main limits the expansion of the system needed to meet increasing demands.
- A. Treelike system
 - B. Booster stations
 - C. Arterial mains
 - D. Regulating system
 - E. None of the Above
93. There are many _____ in the system where water remains for long periods, causing undesirable tastes and odors in nearby service lines.
- A. Treelike system
 - B. Dead ends
 - C. Arterial mains
 - D. Regulating system
 - E. None of the Above
94. The most reliable means to provide water for fire fighting is by _____ into the system.
- A. Treelike system
 - B. Designing redundancy
 - C. Arterial mains
 - D. Regulating system
 - E. None of the Above
95. There are several advantages gained by laying out water mains in a loop or grid, with feeder and _____ interconnecting at roadway intersections and other regular intervals.
- A. Treelike system
 - B. Loop or grid
 - C. Distributor mains
 - D. Regulating system
 - E. None of the Above

Distribution Valves

96. The purpose of installing _____ in water mains at various locations within the distribution system is to allow sections of the system to be taken out of service for repairs or maintenance without significantly curtailing service over large areas.
- A. Distribution system
 - B. Branch mains
 - C. Shutoff valves
 - D. Distribution loops
 - E. None of the Above
97. Valves should be installed at intervals not greater than 5,000 feet in long supply lines and 1,500 feet in main _____ or feeders.
- A. Distribution system
 - B. Branch mains
 - C. Shutoff valves
 - D. Distribution loops
 - E. None of the Above
98. All _____ connecting to feeder mains or feeder loops should have valves installed as close to the feeders as practical. In this way, branch mains can be taken out of service without interrupting the supply to other locations.
- A. Distribution system
 - B. Branch mains
 - C. Shutoff valves
 - D. Distribution loops
 - E. None of the Above

99. In the areas of greatest water demand or when the dependability of the _____ is particularly important, valve spacing of 500 feet maybe appropriate.
- A. Distribution system
 - B. Branch mains
 - C. Shutoff valves
 - D. Distribution loops
 - E. None of the Above
100. At intersections of distribution mains, the number of valves required is normally one less than the number of _____.
- A. Distribution system
 - B. Radiating mains
 - C. Shutoff valves
 - D. Distribution loops
 - E. None of the Above
101. The _____ omitted from the line is usually the one that principally supplies flow to the intersection.
- A. Distribution system
 - B. Branch mains
 - C. Valve
 - D. Distribution loops
 - E. None of the Above
102. _____ should be installed in standardized locations (that is, the northeast comer of intersections or a certain distance from the center line of streets), so they can be easily found in emergencies.
- A. Distribution system
 - B. Branch mains
 - C. Shutoff valves
 - D. Distribution loops
 - E. None of the Above
103. All buried small- and medium-sized valves should be installed in _____.
- A. Distribution system
 - B. Branch mains
 - C. Valve boxes
 - D. Distribution loops
 - E. None of the Above
104. Large _____ (about 30 inches in diameter and larger), it may be necessary to surround the valve operator or entire valve within a vault or manhole to allow repair or replacement.
- A. Distribution system
 - B. Branch mains
 - C. Shutoff valves
 - D. Distribution loops
 - E. None of the Above
105. There are two major classifications of _____: Rotary and Linear.
- A. Distribution system
 - B. Branch mains
 - C. Water valves
 - D. Distribution loops
 - E. None of the Above

106. _____ are used when a straight-line flow of fluid and minimum flow restriction are needed.
- A. Gate valves
 - B. Thermal binding
 - C. Pressure equalizer
 - D. Over-pressurization
 - E. None of the Above
107. _____ are so-named because the part that either stops or allows flow through the valve acts somewhat like a gate. The gate is usually wedge-shaped.
- A. Gate valves
 - B. Thermal binding
 - C. Pressure equalizer
 - D. Over-pressurization
 - E. None of the Above
108. When the valve is wide open the gate is _____ into the valve bonnet. This leaves an opening for flow through the valve the same size as the pipe in which the valve is installed.
- A. Fully drawn up
 - B. Thermal binding
 - C. Pressure equalizer
 - D. Over-pressurization
 - E. None of the Above
109. Gate valves are not suitable for _____. The control of flow is difficult because of the valve's design, and the flow of fluid slapping against a partially open gate can cause extensive damage to the valve.
- A. Gate valves
 - B. Throttling purposes
 - C. Pressure equalizer
 - D. Over-pressurization
 - E. None of the Above
110. _____ in the temperature and/or pressure of the working fluid are often the cause of a valve failing to open.
- A. Gate valves
 - B. Variations
 - C. Pressure equalizer
 - D. Over-pressurization
 - E. None of the Above
111. _____ can occur in high temperature situations depending on the seat and wedge material, length of exposure and closing torque applied.
- A. Gate valves
 - B. Thermal binding
 - C. Pressure equalizer
 - D. Over-pressurization
 - E. None of the Above
112. _____ can cause galling on the valve sealing surfaces as well as on the guides.
- A. Gate valves
 - B. Thermal binding
 - C. Pressure equalizer
 - D. Over-pressurization
 - E. None of the Above

113. A valve can lock in the closed position when high pressure enters the cavity and has no way to escape. This is known as _____.

- A. Gate valves
- B. Thermal binding
- C. Pressure equalizer
- D. Over-pressurization
- E. None of the Above

114. _____ in the temperature and/or pressure of the working fluid are often the cause of a valve failing to open.

- A. Gate valves
- B. Thermal binding
- C. Pressure equalizer
- D. Variations
- E. None of the Above

115. _____ can occur in high temperature situations depending on the seat and wedge material, length of exposure and closing torque applied.

- A. Gate valves
- B. Thermal binding
- C. Pressure equalizer
- D. Over-pressurization
- E. None of the Above

116. _____ can cause galling on the valve sealing surfaces as well as on the guides.

- A. Gate valves
- B. Thermal binding
- C. Pressure equalizer
- D. Over-pressurization
- E. None of the Above

117. A valve can lock in the closed position when high pressure enters the cavity and has no way to escape. This is known as _____.

- A. Single direction sealing
- B. Thermal binding
- C. Pressure equalizer
- D. Over-pressurization
- E. None of the Above

118. _____ gate valves have a nameplate on the side of the valve that has a relief hole or pressure equalizer. This should be the high pressure side when the valve is closed.

- A. Single direction sealing
- B. Thermal binding
- C. Pressure equalizer
- D. Over-pressurization
- E. None of the Above

119. Most Globe valves have compact _____ type, bolted bonnet, rising stem, with renewable seating valves.

- A. Globe valves
- B. Bonnet
- C. Seat
- D. Throttling
- E. None of the Above

120. A Check Valve spring loaded disc resulting with most advanced design features provides the _____ in dependable, economical flow control.

- A. Globe valves
- B. Bonnet
- C. Seat
- D. Throttling
- E. None of the Above

121. _____ should usually be installed with the inlet below the valve seat.

- A. Globe valves
- B. Bonnet
- C. Seat
- D. Throttling
- E. None of the Above

122. For severe throttling service, the valve may be installed so that the flow enters over the top of the _____ and goes down through it. Note that in this arrangement, the packings will be constantly pressurized.

- A. Globe valves
- B. Bonnet
- C. Seat
- D. Throttling
- E. None of the Above

123. If the valve is to be installed near _____ service, verify with an outside contractor or a skilled valve technician.

- A. Globe valves
- B. Bonnet
- C. Seat
- D. Throttling
- E. None of the Above

124. The valve should be welded onto the line with the disc in the fully _____. Leaving it even partially open can cause distortion and leaking. Allow time for the weld to cool before operating the valve the first time in the pipeline.

- A. Globe valves
- B. Bonnet
- C. Seat
- D. Throttling
- E. None of the Above

125. The preferred orientation of a _____ is upright. The valve may be installed in other orientations, but any deviation from vertical is a compromise.

- A. Globe valve
- B. Bonnet
- C. Seat
- D. Throttling
- E. None of the Above

126. Installation upside down is not recommended because it can cause dirt to accumulate in the _____.

- A. Globe valves
- B. Bonnet
- C. Seat
- D. Throttling
- E. None of the Above

127. _____ is trapped on threads and/or in the packing area: This is a common problem when valves are installed outdoors in sandy areas and area not cleaned before operating.

- A. Valve components
- B. Quick-acting
- C. Foreign debris
- D. Handwheel
- E. None of the Above

128. Always inspect threads and packing area for particle obstructions, even seemingly small amounts of sand trapped on the drive can completely stop large valves from _____.

- A. Valve components
- B. Quick-acting
- C. Foreign debris
- D. Handwheel
- E. None of the Above

129. The valve may stop abruptly when a cycle is attempted. With the line pressure removed from the valve, disconnect the actuator, gear operator or _____ and inspect the drive nut, stem, bearings and yoke bushing.

- A. Valve components
- B. Quick-acting
- C. Foreign debris
- D. Handwheel
- E. None of the Above

130. Contaminated parts should be cleaned with a lint-free cloth using alcohol, varsol or equivalent. All parts should be re-lubricated before re-assemble. If the valves are installed outdoors in a sandy area, it may be desirable to cover the _____ with jackets.

- A. Valves
- B. Quick-acting
- C. Foreign debris
- D. Handwheel
- E. None of the Above

131. If the _____ are faulty or damaged: If you suspect that the valve components are damaged or faulty contact specialized services or an outside contractor.

- A. Valve components
- B. Quick-acting
- C. Foreign debris
- D. Handwheel
- E. None of the Above

132. If the valves _____ is too small: Increasing the size of the handwheel will reduce the amount of torque required to operate the valve. If a larger handwheel is installed, the person operating the valve must be careful not to over-torque the valve when closing it.

- A. Valve components
- B. Quick-acting
- C. Foreign debris
- D. Handwheel

133. Most ball valves are the _____ type. They require only a 90-degree turn to either completely open or close the valve.

- A. Valve components
- B. Quick-acting
- C. Foreign debris
- D. Handwheel
- E. None of the Above

134. Many ball valves are operated by _____. This type of gearing allows the use of a relatively small handwheel and operating force to operate a fairly large valve. Always follow standard safety procedures when working on a valve.

- A. Valve components
- B. Quick-acting
- C. Foreign debris
- D. Planetary gears
- E. None of the Above

135. Butterfly Valves are usually found in both treatment plants and throughout the distribution system. If the valve is not broken, it is relatively easy to operate. It is usually accompanied by a Gate valve used as a by-pass to prevent _____.

- A. Bypass
- B. Water Hammer
- C. Valve
- D. Disc
- E. None of the Above

136. These are _____ types of valves usually found on large transmission lines. They may also have an additional valve beside it known as a "bypass" to prevent a water hammer.

- A. Bypass
- B. Rotary
- C. Valve
- D. Disc
- E. None of the Above

137. Some of these _____ valves can require 300-600 turns to open or close.

- A. Bypass
- B. Butterfly
- C. Valve
- D. Disc
- E. None of the Above

138. Most Valvememen or the politically correct term Valve Operators will use a machine to open or close a _____ Valve, the machine will count the turns required to open or close the valve.

- A. Bypass
- B. Butterfly
- C. Valve
- D. Disc
- E. None of the Above

139. _____ valves should be installed with the valve shaft horizontal or inclined from vertical. Always follow standard safety procedures when working on a valve.

- A. Bypass
- B. Butterfly
- C. Valve
- D. Disc
- E. None of the Above

140. A _____ is any temporary or permanent connection between a public water system or consumer's potable (i.e., drinking) water system and any source or system containing nonpotable water or other substances.

- A. Backsiphonage
- B. Backpressure
- C. Control contamination
- D. Cross-connection
- E. None of the Above

141. 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. Backsiphonage
- B. Backpressure
- C. Control contamination
- D. Cross-connection
- E. None of the Above

142. There are two types of _____ --**backpressure** and **backsiphonage**.

- A. Backsiphonage
- B. Backpressure
- C. Control contamination
- D. Cross-connection
- E. None of the Above

143. _____ is backflow caused by a negative pressure (i.e., a vacuum or partial vacuum) in a public water system or consumer's potable water system.

- A. Backsiphonage
- B. Backpressure
- C. Control contamination
- D. Cross-connection
- E. None of the Above

144. _____ can occur when there is a stoppage of water supply due to nearby fire fighting, a break in a water main, etc.

- A. Backsiphonage
- B. Backpressure
- C. Control contamination
- D. Cross-connection
- E. None of the Above

145. _____ is 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. Backsiphonage
- B. Backpressure
- C. Control contamination
- D. Cross-connection
- E. None of the Above

146. _____ (i.e., downstream pressure that is greater than the potable water supply pressure) can result from an increase in downstream pressure, a reduction in the potable water supply pressure, or a combination of both. Increases in downstream pressure can be created by pumps, temperature increases in boilers, elevation, etc.

- A. Backsiphonage
- B. Backpressure
- C. Control contamination
- D. Cross-connection
- E. None of the Above

147. The primary responsibility of the _____ is to develop and maintain a program to prevent or control contamination from water sources of lesser quality or other contamination sources from entering into the public water system.

- A. Federal Government
- B. Water purveyor
- C. Safe Drinking Water Act
- D. Separate states
- E. None of the Above

148. Under the provisions of the Safe Drinking Water Act of 1974, (SDWA) and current Groundwater Protection rules the _____through the EPA, (Environmental Protection Agency), set national standards of safe drinking water.

- A. Federal Government
- B. Water purveyor
- C. Safe Drinking Water Act
- D. Separate states
- E. None of the Above

149. The _____are responsible for the enforcement of these standards as well as the supervision of public water systems and the sources of drinking water.

- A. Federal Government
- B. Water purveyor
- C. Safe Drinking Water Act
- D. Separate states
- E. None of the Above

150. The water purveyor or supplier is held responsible for compliance to the provisions of the _____, to provide a warranty that water quality by their operation is in conformance with EPA standards at the source, and is delivered to the customer without the quality being compromised as its delivery through the distribution system.

- A. Federal Government
- B. Water purveyor
- C. Safe Drinking Water Act
- D. Separate states

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