

Registration form

**COLLECTION 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. _____

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

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

Collections _____ WWT _____ Other _____

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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 fully understand that this type of study program deals with dangerous, changing conditions and various laws and that I will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable in any fashion for any errors, omissions, advice, suggestions or neglect contained in this CEU education training course or for any violation or injury, death, neglect, damage or loss of your license or certification caused in any fashion by this CEU education training or course material suggestion or error or my lack of submitting paperwork. It is my responsibility to 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. It is my responsibility to ensure all information is correct and to abide with all rules and regulations.

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.

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You can obtain a printed version of the course manual from TLC for an additional \$89.95 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.

Collections 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? _____

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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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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.

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**Collections Certification Preparation CEU Training Course
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Collections Certification Preparation CEU Training Course Assignment

The Assignment (Exam) is also available in Word on the Internet for your Convenience, please visit www.ABCTLC.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. If you should need any assistance, please email all concerns and the completed manual to info@tlch2o.com.

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. You can e-mail or fax your Answer Key along with the Registration Form to TLC. **(S) Means answer may be plural or singular. Multiple Choice Section, One answer per question and please use the answer key.**

1. Collection system operators should be aware if other utilities experience failure. Which of the following **would not** cause a problem for the collection system? SAC-WC-V1 sec. 1.2
 - A. Lift stations will not operate
 - B. Gravity flow would stop
 - C. Gas leaks have the potential for explosions
 - D. Blockage could cause upstream backflow into residence
 - E. None of the Above
2. Liquid waste and liquid-carried waste which unintentionally leaks out of the sewer pipe and into the environment is: SAC-WC-V1 sec. 2.0
 - A. Exfiltration.
 - B. Infiltration
 - C. Percolation
 - D. None of the Above
3. When working in tight quarters where vertical lifts are required, which type of buckets are installed on cranes for excavation? SAC-WC-V1 sec. 3.700
 - A. Boring and Tunneling rod
 - B. Clamshells and draglines
 - C. Spanner bucket
 - D. Clevis
 - E. None of the Above
4. Flow variations are common for the collection system. Which of the following would cause a seasonal change? SAC-WC-3.24
 - A. Residential
 - B. Commercial
 - C. 24-hour Industrial
 - D. Liquefaction
 - E. Infiltration and inflow
5. Which of the following types of sewers are the main "arteries" of a wastewater collection system; they convey the wastewater from numerous main sewers either to a treatment plant or an interceptor sewer. SAC-WC-V1 sec. 3.30
 - A. Trunk
 - B. RCP
 - C. Drain
 - D. Upflow
 - E. None of the Above

6. When conducting a field survey, which of the following would not be included as physical information. SAC-WC-V1 sec. 3.41

- A. Population growth
- B. Location and elevations of buildings
- C. Location of underground utilities
- D. Surface improvements
- E. None of the Above

7. Which of the following creates scouring or self-cleaning of the sewer line?

SAC-WC-V1 sec. 3.42

- A. Velocity
- B. Size of sewer
- C. Design flow
- D. Inadequate slope of sewer
- E. None of the Above

8. Deviation from the _____ could cause the sewer to become too shallow for adequate cover on the pipe or too deep for safe and economical construction. SAC-WC-V1 sec. 3.42

- A. Velocity
- B. Size of sewer
- C. Ground slope
- D. Axis
- E. None of the Above

9. Once the location of a manhole is established and preparations for the raising of the manhole are made, where is the casting placed? SAC-WC-V1 sec. 7.702

- A. Center of cone
- B. Outside edge of cone
- C. Above manhole frame
- D. None of the above

10. Which of the following would not be considered part of trenching procedures?

SAC-WC-V1 sec. 3.702

- A. Retaining walls
- B. Water accumulation
- C. Preventative maintenance
- D. Shoring systems
- E. None of the Above

11. What is the purpose of controls in the sewer system? SAC-WC-V1 sec. 3.71

- A. To know where the operators are at all times
- B. To guide the backhoe operator during excavation
- C. To ensure that the sewer lines and appurtenances are constructed as planned
- D. None of the above

12. What material can be used for sewer pipe bedding and initial backfill?

SAC-WC-V1 sec. 3.722

- A. Sand
- B. Native material
- C. Crushed rock aggregate
- D. All of the above.

13. After joining a length of pipe, a construction worker should always: SAC-WC-V1 sec. 3.732
- A. Completely backfill that section immediately
 - B. Slowly back the pipe out to check the condition of the gasket
 - C. Inspect the shoring to detect any shifts or changes
 - D. Check the alignment and grade of the pipe
 - E. Write a report to the supervisor
14. All of the following are components of a gravity collection system except: SAC-WC-V1 sec. 3.30
- A. Vacuum interface pumps
 - B. Main sewers
 - C. Lateral sewers
 - D. Lift stations
 - E. None of the Above
15. A negative aspect of using concrete pipe is that the pipe can be: V1 sec. 3.7465
- A. Contaminated by the use of polymers or degreasers
 - B. Deflected up to 45 degrees under stress or load
 - C. Corroded by acids formed by hydrogen sulfide gas
 - D. Perforated by the use of sand as a bedding material
 - E. None of the Above
16. The operator is digging in a location for construction of a new sewer line extension. Which of the following is the first safety precaution performed while working on the project? SAC-WC-V1 Fig. 3.12
- A. Install shoring on the deep sections of pipe to be laid
 - B. Wear oxygen deficiency meter at all times
 - C. Notify the emergency medical units in the area before digging
 - D. Notify all utility companies for location of the nearby buried lines
 - E. None of the Above
17. When backfilling the dirt around a flexible pipe such as plastic, if the load above the pipe is too great, the pipe will simply: SAC-WC-V1 sec. 3.721
- A. Deflect and collapse
 - B. Float due to upward movements
 - C. Clog due to improper sealing
 - D. Flexible pipe is not affected by heavy loads
 - E. None of the Above
18. Control points are used during sewer construction to: SAC-WC-V1 sec. 3.71
- A. Ensure that the collection system is constructed as planned
 - B. Locate the bench mark
 - C. Find the invert
 - D. Find the deviation
 - E. None of the Above

19. The operator is using chemicals to prevent clogs in a sewer line. There is an old container of sewer cleaner in the shop building. This chemical clearly contains metal shavings. Why should the operator not use this chemical in the sewer line? SAC-WC-V1 sec. 3.721

- A. The metal will coat the pipes
- B. Methane gas will form in the lines
- C. The chemical will be ineffective
- D. Hydrogen gas may be found in the lines
- E. None of the Above

20. Which of the following terms refer to a measure of electrical power needed by a device? SAC-WC-V2 sec. 9.11

- A. Watts
- B. Amps
- C. Ohms
- D. Volts
- E. None of the Above

21. Which of the following is the recommended type of fuse to use in the circuit leading to the electric motor? SAC-WC-V2 sec. 9.132

- A. Phase fuse
- B. Sand-filled fuse
- C. Voltage sensing fuse
- D. Time-delay fuse
- E. None of the Above

22. Grounding of electrical equipment is necessary to ensure the safety of the operator. Which of the following conditions make grounding unsatisfactory? SAC-WC-V2 sec. 9.134

- A. A conductor opens and is not connected to ground
- B. Copper rods greater than 1 inch in diameter
- C. Cool and damp ground
- D. High temperature and humidity
- E. None of the Above

23. Electric motors fail for many reasons. All of the following are major reasons for motor failure **EXCEPT** for: SAC-WC-V2 sec. 9.231

- A. Overloading the motor
- B. Air-locking the rotor
- C. Voltage imbalance
- D. Short cycling
- E. None of the Above

24. Prior to resetting a tripped circuit breaker, the operator should: WC-V2 sec. 9.133

- A. Inspect the electrical equipment for problems
- B. Complete the appropriate work order
- C. Put on insulated boots
- D. Trip the main breaker
- E. None of the Above

25. Daily maintenance of air compressors should include regular: WC-V2 sec. 9.5
- A. Testing for amperage draw
 - B. Draining of condensation from the tank
 - C. Tightening of head bolts
 - D. Ejector replacement
 - E. None of the Above
26. Care and maintenance of equipment is important for all of the following reasons EXCEPT: SAC-WC-V2 sec. 6.130
- A. Neglected equipment can be dangerous to use
 - B. Equipment maintenance is a good indoor activity for very hot days
 - C. Equipment failures cause lost working time
 - D. Equipment replacement and repair is very costly
27. Which of the following can **NOT** result from the blockage of a sewer system? SAC-WC-V1 sec. 1.2
- A. Increased annual flows
 - B. Overflowing manholes
 - C. Septic wastewater
 - D. Flooded basements and buildings
 - E. None of the Above
28. If flows through a sewer line were fluctuating during the day, this would indicate: SAC-WC-V1 sec. 3.24
- A. Everything is normal
 - B. That main lift stations are in need of repair
 - C. The velocity of the flow is too great
 - D. Blockages are in the line and keep shifting
 - E. None of the Above
29. When the atmosphere in the confined space is 18%, the space is : SAC-WC-V1 sec. 4.40
- A. Super saturated
 - B. Oxygen rich
 - C. Oxygen deficient
 - D. Methane rich
30. Which of the following is the major source of odors in collection systems? SAC-WC-V1 sec. 6.44
- A. Methane
 - B. Hydrogen sulfide
 - C. Decomposing animals
 - D. Sludge deposits
 - E. None of the Above
31. Anaerobic Conditions may occur in the collection system. This condition is caused by: SAC-WC-V1 sec. 6.44
- A. Presence of oxygen
 - B. Absence of dissolved oxygen
 - C. Loss of hydrogen sulfide
 - D. Production of methane gas
 - E. None of the Above

32. The vertical height of water above a certain point is known as the: SAC-WC-V1 sec. 6.04
- A. Strength of the water
 - B. Head of the water
 - C. Lift of the water
 - D. Rise of the water
 - E. None of the Above
33. Infiltration is a term used in the collection system is caused from: SAC-WC-V1 sec. 2.0
- A. Industrial wastes
 - B. Ground water
 - C. Septic waters
 - D. Waters with low pH levels
 - E. None of the Above
34. Regularly checking equipment, changing lubricants and testing equipment is part of which maintenance program: SAC-WC-V1 sec. 2.0
- A. Corrective
 - B. Premeditated
 - C. Perceptive
 - D. Preventive
 - E. None of the Above
35. The cylindrical part of a pipe that may have a bell on one end is known as a: SAC-WC-V1 sec. 6.010
- A. Barrel
 - B. Shim
 - C. Seismic indicator
 - D. Shoring
 - E. None of the Above
36. A pipe that conveys wastewater under pressure from the discharge side of a pump to a point of gravity flow downstream is known as a: SAC-WC-V2 sec. 8.0
- A. Force Main
 - B. Aerobic Main
 - C. Action Man
 - D. Septic Main
 - E. None of the Above
37. All gravity sewer lines must be laid with the proper slope. The method of calculating and defining Slope is: SAC-WC-V1 sec. 3.42
- A. Rise over the run
 - B. Run over the rise
 - C. Length over run
 - D. Rise by the length
38. Corrosion of the internal surface of collection systems is caused by the formation of: SAC-WC-V1 sec. 6.51
- A. Muriatic acid
 - B. Hydrogen sulfite
 - C. Carbonic acid
 - D. Sulfuric acid
 - E. None of the Above

39. The Invert of a pipe is considered to be the: SAC-WC-V1 sec. 3.41
- Top of the pipe
 - Inner bottom of the pipe
 - Outside bottom of the pipe
 - Side walls of the pipe
40. Oxygen Deficiency is considered to be an atmosphere that contains less than:
SAC-WC-V1 sec. 3.41
- 19.5% oxygen
 - 24.5% oxygen
 - 21% oxygen
 - 27% oxygen
 - None of the Above
41. What is the purpose of lamping a new collection system? SAC-WC-V1 sec. 3.41
- Test the joint's seals
 - Test for obstructions and straightness
 - Test for methane gas
 - Test for slope
 - None of the Above
42. Smoke testing sewer lines shows operators' sources of inflow and infiltration. Another purpose for smoke testing is to: SAC-WC-V1 sec. 5.60
- Locate lost manholes.
 - Neutralize sewer gasses which build up in the lines
 - Produce a positive head in the system
 - Release any pathogen contaminates in the lines
 - None of the Above
43. Most _____ is deliberately discharged into the collection system by commercial or residential customers. The best method of controlling inflow is by _____. 2 part question.
SAC-WC-V1 sec. 5.110
- Leakage, Disconnecting the tap from the main line
 - Inflow, Placing a flow control valve in the lateral
 - Inflow, Having a sewer-use ordinance
 - Solids, Placing a flow meter in the lateral line and billing the discharger accordingly
 - None of the Above
44. Various inspection methods can detect signs of exfiltration in collection systems. Exfiltration is defined as: SAC-WC-V1 sec. 5.112
- The leakage of wastewater out of the collection system
 - Increased flows in the collection system
 - The clogging of storm filters in the collection system
 - Groundwater entering the collection system
 - None of the Above

45. Even after informing the public of smoke testing, there may be some individual who will not react calmly if smoke is entering his home or coming up from the yard area. Which of the following precautions is recommended for these situations? SAC-WC-V1 sec. 5.42
- A. All operators involved with the testing should be trained to handle these conditions
 - B. Always have a doctor standing by for any medical emergencies
 - C. Do not go near the home or person involved with the residence in question
 - D. Refer all angry residents who react to the City's/Town's lawyer
 - E. All of the above
46. Once a manhole is installed and accepted in the collection system, the operator should: SAC-WC-V1 sec. 6.25
- A. Inspect the manhole every one to five years
 - B. Gunitite the manhole yearly
 - C. Never open the lid unless an emergency exists
 - D. Paint the interior of the manhole with an enamel paint
 - E. Look for deviation
47. The primary purpose of forced draft ventilation in lift stations is to: V2 sec. 8.18
- A. Prevent odors
 - B. Cool the pumps
 - C. Remove dangerous gases
 - D. Keep air pressure equalized
 - E. None of the Above
48. Which of the following pieces of equipment would **NOT** be expected in a dry well? SAC-WC-V2 sec. 8.012
- A. Electric controls
 - B. Float switches
 - C. Motors
 - D. Pumps
 - E. None of the Above
49. The best material to use for anchoring hardware and equipment in a lift station is: SAC-WC-V2 sec. 8.106
- A. Stainless steel anchor bolts
 - B. Aluminum anchor bolts
 - C. Fiberglass anchor bolts
 - D. Hardened steel anchor bolts
 - E. All of the above
50. The pumps and controls that are used to lift up the wastewater for gravity flows are called: SAC-WC-V2 sec. 8.0
- A. Mains
 - B. Digesters
 - C. Manholes
 - D. Lift stations
 - E. None of the Above

51. Which of the following pieces of equipment is used in a lift station to prevent the discharged wastewater in the force main from flowing back into the wet well when the pump shuts off?

SAC-WC-V2 sec. 8.172

- A. Shaft braking system on the pump
- B. Gate or plug valve
- C. Pressure relief valve
- D. Swing check valve
- E. None of the Above

52. Air bubbler systems in lift stations are also known as: SAC-WC-V2 sec. 8.153

- A. Air fresheners
- B. Water ventilators
- C. Air gap protection devices
- D. Pressure sensing controllers

53. A 24-inch sewer carries an average daily flow of 5 MGD. If the average daily flow per person from the area served is 100 GPCD (gallons per capita or person per day), how many people discharge into the wastewater collection system? SAC-WC-V1 A.12 sec. A #1

- A. 30,000 persons
- B. 40,000 persons
- C. 50,000 persons
- D. 60,000 persons
- E. None of the Above

54. A sewer has failed and 127 feet of 8-inch pipe must be replaced. How many 5-foot sections of pipe will be required? SAC-WC-V1 A.12 sec. A

- A. 26 sections needed
- B. 23 sections needed
- C. 21 sections needed
- D. 32 sections needed
- E. None of the Above

55. Estimate the velocity of wastewater flowing in a 12-inch sewer. A red dye is poured into an upstream manhole. Three minutes later the dye first appears in a manhole 400 feet downstream. The dye disappears 3 minutes and 40 seconds after the dye is poured into the upstream manhole. SAC-WC-V1 A.12 sec. A #1

- A. 1.0 ft./sec
- B. 3.0 ft./sec
- C. 2.0 ft./sec
- D. 4.0 ft./sec
- E. None of the Above

56. The distance between two manholes on a map is measured as 15/16 of an inch. Scale for the map is 1 inch equals 800 feet. Estimate the actual distance between the two manholes.

SAC-WWC-V1 A.12 sec F #20

- A. 57 feet
- A. 750 feet
- C. 550 feet
- D. None of the above

Some questions may repeat for QA/QC purposes.

57. What was the average daily flow for a lit station given the following flow totalizer readings?
8:00 a.m., Monday, August 11 - 113,428,731 gallons 8:00 a.m., Monday August 18 -
121,987,566 gallons. SAC-WC-V1 A.12 sec. B #5

- A. 3.38 MGD
- B. 1.22 MGD
- C. 4.00 MGD
- D. 4.46 MGD

58. Which of the following describes the proper adjustment of the packing gland in a centrifugal pump?

SAC-WC-V2 sec. 9.42

- A. Tighten until gland is 1/8 turn past the no leakage point
- B. Tighten gland until there is a flow of 20 to 60 drops of water per minute
- C. Adjust packing gland until no leakage occurs
- D. Gland needs to be tighten until it forms to the pump shaft with a slow steady leak
- E. None of the Above

59. Operators are sometimes reluctant to wear protection, so the first step for ensuring the protection of workers is? SAC V-1 sec. 4.9

- A. Ensure that adequate engineering controls are used on equipment whenever possible, provide hearing protection
- B. Instruct operators to break every 15 minutes while using a jackhammer
- C. Establish a strict disciplinary program
- D. Rotate workers frequently so the load noise is equally distributed
- E. None of the Above

60. Many collection systems have a "Station Book", what information does this station book contain?

SAC-WC-V2 sec. 8.321

- A. All flow records
- B. Accounts of customer services
- C. ID numbers and maps of the station
- D. Personnel qualified to operate the station
- E. None of the Above

61. Work Directives or Work Orders are used by supervisors to help maintain an efficient operating system. These directives are given to the operational staff to help in the use of:

SAC-WC-V2 sec. 12.7040

- A. People, purchase orders and reports
- B. Money, overtime and hours
- C. Vehicles, routes and time tables
- D. Time, materials and equipment
- E. None of the Above

62. Maintenance on a pneumatically operated diaphragm pump should include: SAC-WC-V2 sec. 8.153

- A. Periodic inspection of the packing and shaft sleeves
- B. Proper adjustment of the packing gland nut
- C. Thorough flushing of the pump with water
- D. Inspection for signs of cavitation
- E. None of the Above

63. Which of the following is true concerning the discharge of water from a piston pump?
SAC-WC-V2 sec. 9.313
- A. The discharge valve should never be closed
 - B. The discharge pressure is determined by the speed of the pump
 - C. Gate valves should be used to control discharge
 - D. None of the Above
64. When pumping water out of a deep trench, the trash pump should be located:
SAC-WC-V2 sec. 9.316
- A. As close to surface of the water as possible, without danger of falling into the trench
 - B. Midway between the ends of the suction and discharge lines
 - C. Close to the discharge pressure level for that pumps net positive suction lift
 - D. None of the above
65. Mechanical seals are common components of centrifugal pumps. One of the advantages mechanical seals have over packing is: SAC-WC-V2 sec. 9.43
- A. Mechanical seals do not need adjustment routinely
 - B. Mechanical seals are very easy to replace
 - C. Seals cost less than packing material
 - D. The pump can continue to run even if seals fail
66. Close-coupled pumps refer to the method in which the motor and pump are joined. Which of the following describes the close-coupled pump? SAC-WC-V2 sec. 9.43
- A. No coupling between the motor and pump
 - B. A short flexible coupling between the pump and motor
 - C. Short extensions of the shafts are threaded together
 - D. A flexible shaft similar to the drive shaft of a car
67. Record-keeping by field personnel is the backbone of any record-keeping system. When is the best time to complete reports if work is performed at several sites in the day? SAC-WC-V2 sec. 12.743
- A. At the end of the day. This will enable you to compare work throughout the day
 - B. At the end of the week
 - C. Before leaving a site after the work has been accomplished
 - D. Use spare moments throughout the day to complete records
68. Collection system maps should provide the information staff and operators need to plan and conduct operations and maintenance. To be useful maps should show all of the following **EXCEPT**:
SAC-WWC-V2 sec 12.6
- A. Mains, trunks and interceptors
 - B. Fire hydrants and meters
 - C. Building sewers
 - D. Clean-outs and manholes
 - E. None of the Above

Some questions may repeat for QA/QC purposes.

69. Known elevations are vital to the operators of gravity wastewater collections systems. When you are adding the manhole depth to the invert elevation, what information will known elevations provide you with? WWC-V2 sec 12.612
- A. There is no system which provides this information
 - B. Depth of the building connection
 - C. Flow lines leaving the manhole
 - D. Manhole rim
 - E. None of the Above
70. Upon entering a confined space, your oxygen meter indicates a reading of 15.9%. What course of action is appropriate? SAC-WC-V1 sec. 4.40
- A. Leave the space immediately, continuously ventilate the area and recheck the oxygen concentration
 - B. Continue working, there is sufficient oxygen
 - C. The oxygen meter needs to be replaced
 - D. The confined space needs to be evaluated for potential hazards
71. Operator safety while working in a collection system is every person's responsibility. What two important factors need to be considered for the protection of the operators? SAC-WC-V1 sec. 4.57
- A. The cost of protective safety gear and the time needed for training
 - B. Personal hygiene and protective equipment for the head, hands and body
 - C. Inventory of tools and materials to be used
 - D. A confined space permit and briefing by the project supervisor
 - E. None of the Above
72. Before entering a confined space such as a manhole, the crew supervisor should always perform which of the following? SAC-WC-V1 sec. 4.70
- A. Review the procedures and safety procedures with the operators
 - B. Spray the operator entering the manhole with a disinfectant
 - C. Have all operators sign a release form of liability
 - D. Enter the manhole before the operator for a show of confidence to the operators
 - E. None of the Above
73. Positive pressure **SCBAs** and full facepiece **SARs** can be used in oxygen deficient atmospheres containing less than **WHAT PERCENTAGE OF OXYGEN** and **WHAT OTHER Atmospheric Condition**? SAC-WC-V1 sec. 4.50
- A. Containing less than 19.5 % oxygen and open circuit atmosphere readings
 - B. Containing less than 19.5% oxygen and IDLH atmosphere conditions
 - C. Less than 15.5% oxygen reading and conditions with negative pressure respirators
 - D. More than 19.5% oxygen and atmospheres considered Immediately Dangerous to Life or Health according to OSHA's regulations
 - E. None of the Above
74. Traffic must be rerouted around a work area. The area where traffic is funneled or channeled into a different pattern is known as the: SAC-WC-V1 sec. 4.361
- A. Transition area
 - B. Advanced warning area
 - C. Work area
 - D. Termination area
 - E. None of the Above

75. Before entered by personnel, all _____ should be considered _____.
SAC-WC-V1 sec. 4.40

- A. Manholes, Confined spaces and unsafe
- B. Manholes, Unsafe only when two of the tests show problems
- C. Lantern Rings, Safe until oxygen levels fall below 12% oxygen
- D. Culverts, Mechanically vented spaces that are not dangerous
- E. None of the Above

76. A manhole is infested with insects and the walls are full of slime from a wastewater backup. Which of the following should be performed before the operator enters the manhole in the area?

SAC-WC-V1 sec. 4.44

- A. Flooding the line with chlorinated water
- B. Spray with water-soluble insecticide, wash down with high-pressure hose and reapply insecticide if needed after the line maintenance is performed
- C. Flushing the line with insecticide and hydrogen peroxide solutions
- D. None of the above

77. Whenever it is necessary to work on a piece of equipment or machinery, the operator should do the following: SAC-WC-V1 sec. 4.9

- A. Use the proper tools while equipment is running
- B. Have the proper PPE
- C. Be aware of other hazards that potential can occur
- D. Follow all lockout / tagout procedures
- E. None of the Above

78. _____ monitoring in a confined space should be performed _____.
SAC-WC-V1 sec. 4.71

- A. Hearing, Prior to entry
- B. Atmospheric, Continuously from pre-entry to exit
- C. Atmospheric, When conditions require it
- D. Wastewater, Periodically throughout entry
- E. None of the Above

79. Hydrogen sulfide gas is toxic and can be fatal if breathed at high concentrations. What makes hydrogen sulfide so difficult to detect by operators when in a confined space? SAC-WC-V1 sec. 4.41

- A. There is no test for hydrogen sulfide
- B. Hydrogen sulfide can deaden the sense of smell
- C. Hydrogen sulfide can only be detected by chemists
- D. Hydrogen sulfide has no smell at low or high concentrations
- E. None of the Above

80. OSHA 29 CFR 1910.147 Control of Hazardous Energy is the section on Lockout/Tagout Procedures. There are many forms of energy present in a collection system, these include: SAC-WC-V1 sec. 4.42

- A. Electrical energy in a pump station
- B. Hydraulic pressure in a pipeline, known as static head
- C. Mechanical energy in a surge-relief valve
- D. All of the above are present in a collection system
- E. None of the Above

81. When operators make short cuts or modifications to the safety procedures, accidents tend to happen. Which of the following reduces the chance of accidents? SAC-WC-V1 sec. 4.0

- A. Fire department personnel should be called out to the job site
- B. Good planning of the job before the work starts
- C. Allowing only one operator at the job site to reduce the risk factor
- D. Performing the task quickly can cut the risk of injuries
- E. None of the Above

82. Which of the following should be observed when filling a water truck to clean sewers: SAC-WC-V1 sec. 6.100

- A. You should crawl inside and light a match to check for gases.
- B. There should be an air gap between the discharge line and the top of the water level to prevent a cross connection.
- C. The truck should be cleaned before each filling
- D. The truck should be filled to 3/4 capacity so it will roll better through turns
- E. None of the Above

83. High velocity cleaning equipment should include: SAC-WC-V1 sec. 6.110

- A. Cable winch
- B. Tag line
- C. Water tank truck
- D. "C" drag bucket
- E. None of the Above

84. Which of the following would be the appropriate course of action if very low flows were observed at a downstream manhole during a flushing operation? SAC-WC-V1 sec. 6.12

- A. Discontinue filling the manhole and make arrangements for extensive cleaning.
- B. Have an operator enter the downstream manhole and hand-rod the line.
- C. Continue the flushing procedure with more water to create a greater head.
- D. Fill the downstream manhole to exert a back-pressure on the blockage.
- E. None of the Above

85. High velocity cleaner maintenance should include draining the hold tank? SAC-WC-V1 sec. 6.332

- A. Daily.
- B. Monthly.
- C. Weekly.
- D. After head loss.
- E. None of the Above

86. The operator has found a leak in the gravity sewer line in an easement behind a set of offices. The line has caved-in and needs to be repaired as soon as possible. Which of the following is the best procedure to follow in this situation? SAC-WC-V1 sec. 3.701

- A. Call the underground service alert (Bluestake) and locate utilities before digging.
- B. Emergencies should be dug up immediately and all other utilities are not notified.
- C. Have a skyhook and x-ray machine brought out.
- D. Perform the work needed and repair all broken utilities that are encountered.
- E. None of the Above

Some questions may repeat for QA/QC purposes.

87. When would an operator choose to rod a sewer line from an upstream position?

SAC-WC-V1 sec. 6.221

- A. If the downstream manhole was hard to locate.
- B. If a high head of water developed at the stoppage
- C. If the blockage was grease or similar material.
- D. Always; this is the proper position.
- E. E. None of the Above

88. Balling is a method of cleaning a sewer line that is completely clogged. Since the procedure takes a head of water behind the ball to remove the debris, the operator must be aware of which of the following problems?

SAC-WC-V1 sec. 6.10

- A. Flooding basements in the area.
- B. Debris passing down the line.
- C. Cracking joints and lines.
- D. Recarbonation.
- E. None of the Above

89. An operator is cleaning a sewer line with a scooter. As the scooter is going down the line the movement of the scooter slows down. Debris has built up ahead of the scooter. What should the operator do to remove the debris? SAC-WC-V1 sec. 6.132

- A. Pull the scooter back 4 or 5 feet which will flush the debris down.
- B. Clean the line out with a hydraulic jet.
- C. Flood the line behind the scooter.
- D. Remove the scooter and rod the line.
- E. None of the Above

90. Before setting the cleaning equipment at a manhole, the operator needs to take certain safety measures. One of the safety precautions is handling the traffic in the area and the other major safety precaution is?

SAC-WC-V1 sec. 6.101

- A. Notify the DEQ of cleaning procedures used.
- B. Uniform inspection
- C. Check with residents in the area about their needs.
- D. Personnel safety around the area.
- E. None of the Above

91. Hydraulic pressure cleaners are used to clear stoppages and clean sewer lines. When using the hydraulic cleaner the operator should always place _____ in the downstream manhole. SAC-WC-V1 sec. 6.110

- A. Debris or sand traps.
- B. Portable chlorinator.
- C. Anti-flotation device.
- D. Flow matching system.
- E. None of the Above

92. When an operator arrives at a sewer line which is clogged, the first step to a solution is identifying possible causes to the clog in the line. Which of the following is **NOT** a possible cause to the stoppage in the sewer line? SAC-WC-V1 sec. 6.010 2
- A. Extremely high pH.
 - B. Root penetration.
 - C. Debris.
 - D. Grease buildup.
 - E. None of the Above
93. When a stoppage occurs in the sewer system, the operator should be aware of which of the following hazardous situations? SAC-WC-V1 sec. 6.010
- A. Potable Water
 - B. Possible nitrogen psychosis.
 - C. Possible oxygen deficiency.
 - D. Odor psychosis created.
 - E. None of the Above
94. When replacing a section of pipe with a steel band coupler, the operator must be careful? SAC-WC-V1 sec. 7.36
- A. To tighten all bolts evenly to prevent leakage.
 - B. To tighten bolts to prevent contamination.
 - C. To tighten bolts with a six-inch wrench.
 - D. To not to use the pyrometer.
 - E. None of the Above
95. "Guniting" is a? SAC-WC-V1 sec. 6.101
- A. Tool used for applying mortar.
 - B. Type of flow measuring devices
 - C. A mixture of sand and cement applied pneumatically that forms a high density, resistant concrete.
 - D. Hydrophilic polymer for sealing leaks and cracks.
96. The operator is repairing a crack in the main sewer line. The sewer is made of vitrified clay pipe. The break in the line is cut out of the main line and the operator is ready to replace the broken section of pipe. What type of pipe is used to replace the broken section? SAC-WC-V1 sec. 7.36
- A. PVC pipe can be used.
 - B. Cast iron pipe must be used.
 - C. Only clay pipe must be used.
 - D. Epoxy coated concrete pipe is used.
97. When performing sewer repairs near curbs and sidewalks, which may have limited space and high traffic, attention should be paid to: SAC-WC-V1 sec. 7.134
- A. Pedestrian safety.
 - B. Placement of spoils and equipment security
 - C. Both answers A and B
 - D. Easement restrictions
 - E. None of the Above

98. The collection system crews are always performing maintenance in driveways, easements and front yards. Before performing system maintenance, the operator should always? SAC-WC-V1 sec. 7.052

- A. Inform the property owner of the residual agent
- B. Inform the property owner of any inconvenience.
- C. Install ground fault protection on any nearby electrical service.
- D. Release a newspaper article telling about emergency repairs.
- E. None of the Above

99. Hydraulic shores are used due to their ease of installation and removal. However, they are usually not used on jobs for a time period greater than five (5) days, because of the following reason(s).

SAC-WC-V1 sec. 7.140

- A. The unit weights about 70 pounds and can only spot brace trenches 22 to 48 inches.
- B. Installation requires more than one person in order to connect the high-pressure hoses.
- C. There is a possibility of the hydraulic pressure bleeding off during this length of time.
- D. All of the above
- E. None of the Above

100. During trenching and shoring operations, soils are classified as hard and compact, unstable, or running. The angle of repose or natural slope would normally be greatest in?

SAC-WC-V1 sec. 7.10

- A. Running soils.
- B. Unstable soils.
- C. Hard, compact soils.
- D. All of the above
- E. None of the Above

101. An effective supervisor is constantly looking for opportunities to train assigned personnel to improve performance. What is the limitation of on-the-job training? SAC-WC-V2 sec.

12.330

- A. Cost of in-house-training
- B. Relies on "in-house" teachers that may narrow scope and resources
- C. Conducted as if there are only experienced collection system operators
- D. Teaches employees about in-house policies
- E. None of the above

102. Which statement best describes the need for a management information system?

SAC-WC-V2

- A. Simplification and improvement of work planning and scheduling, including the integration of recurring and on-demand jobs
- B. Increases reports needed on an annual and biannual basis that includes all work activities
- C. Gives inaccurate or insufficient information that may cause inappropriate actions, confusion, and reduces operator morale
- D. Management information systems should never be used
- E. None of the Above

103. Collection system operators should be encouraged to practice good personal hygiene. What would an outer wear washroom contain? SAC-WC-V2 sec. 12.520

- A. Only paper towels and a trash can
- B. Floor drains, water faucet and a hose
- C. Personnel lockers for clothing
- D. Fire hose for heavy equipment
- E. None of the Above

104. A motor starter is a device or group of devices that are used to connect the electrical power to a motor. Which of the following does not describe how a starter works? SAC-WC-V2 sec. 9.24

- A. Permits low-voltage circuits to energize the starter of equipment at a remote location or to start larger starters
- B. It is operated by electromagnetic action
- C. Has contactors and these operate by energizing a coil which closes the contact
- D. It is usually operated on a lower voltage than the motor
- E. If wired in reverse it will cause the pump to spin backwards

105. Most motors used in lift stations are three-phase voltages. What problem would occur if the voltage becomes imbalanced? SAC-WC-V2 sec. 9.231

- A. Relatively slight variations can greatly increase the motor operating temperature and burn insulation
- B. Bearings will fail first causing extreme vibration in motor
- C. Motor bushings will need to be replaced if imbalance continues
- D. None of the above

106. The heat generated by continuous operation of a motor above its design rating is extremely damaging to the insulation. For additional protection an _____ should be installed.

SAC-WC-V2 sec. 9.231

- A. Overload protection device
- B. GFI
- C. Relay
- D. Solenoid
- E. None of the above

107. The greatest factor that contributes to the reliable operation of electrical systems found in lift stations is knowledge of the system by the operator and to keep it clean, dry and tight.

What are the devices that could be checked on the motor control center? SAC-WC-V2 sec. 9.14

- A. Panel lights for operation
- B. Resistance of load
- C. Motor mounts
- D. Grounding rods
- E. None of the Above

108. Aluminum wire as a conductor has become very common over the years. What is one of the disadvantages aluminum has compared to copper? SAC-WC-V2 sec. 9.14

- A. Aluminum requires very little maintenance
- B. Aluminum costs more than copper
- C. Aluminum is much softer and reacts much more rapidly with the air
- D. None of the above

109. Lift stations can experience mechanical breakdown caused by malfunction in the air bubbler compressor. Which of the following would not be a bubbler type of failure? SAC-WC-V2 sec. 8.324

- A. Electrode coated in grease
- B. Air compressor failed
- C. Condensed water in air lines
- D. Bubbler line broke
- E. None of the Above

110. Plug valves are another type of valve used as an isolation valve in a lift station. Plug valves consist of the valve body and a _____. SAC-WC-V2 sec. 8.171

- A. Sliding gate
- B. Clapper arm
- C. Rotating plug
- D. O-ring stem seal
- E. None of the Above

111. When inspecting a new lift station, it is recommended during the preliminary inspection to have which type of documentation? SAC-WC-V2 sec. 8.22

- A. Pump station calibration
- B. Pump and motor coupling alignment readings
- C. Developed routine and emergency information and procedures
- D. None of the above

112. **TDH** is normally expressed in feet of water as opposed to pounds per square inch. Which of the following is the correct conversion from psi to feet of water? SAC-WC-V2 sec. 8.164

- A. Head, ft = (pressure, psi) (7.48 gal / cuft) (specific gravity of liquid pumped)
- B. Head, ft = (pressure, psi) (8.34 lbs / gal) (lb / square inch)
- C. Head, ft = (pressure, psi) (2.31 days / cuft) (specific gravity of liquid pumped)
- D. Head, ft = (pressure, psi) (2.31 ft / psi) (specific gravity of liquid pumped)
- E. None of the Above

113. Pump curves list several items on the axis lines such as capacity, TDH and RPM. The Net Positive Suction Head is expressed in what measuring unit? SAC-WC-V2 sec. 8.164

- A. Ambient temperature
- B. Revolution per minute
- C. Gallons per minute
- D. Head in feet
- E. None of the Above

114. One of the most frequently overlooked considerations during the pump station design is the addition of _____ on the force main. SAC-WC-V2 sec. 8.02

- A. Air and vacuum release valves
- B. Backwater Valve
- C. Pressure relays
- D. Telemetry
- E. None of the Above

115. The operator is using a CCTV to inspect the sewer line. When viewing the videotape of the lines, the operator spots roots intruding a joint. If the audio states there are roots at joint "5" , the operator knows the "5" refers to the: SAC V-1 sec. 5.322

- A. Distance to the next manhole (in feet)
- B. Number of different roots found at the joint
- C. Severity code of the root system
- D. All of the above
- E. None of the Above

116. When would the use of dyes be most appropriate for sewer inspection?

SAC V-1 sec. 5.50

- A. Prior to using CCTV equipment
- B. In very dry areas
- C. When limited manpower is available
- D. When smoke testing information is incomplete
- E. None of the Above

Some questions may repeat for QA/QC purposes.

117. Given the following information, calculate the proper dosage in pounds of a chemical product designed for the removal of roots. Assume the sewer is completely filled with the concentration.

SAC V-1 sec. A.12 G #23

Pipe diameter: 8 inches

Pipe length: 400 feet

Dose: 100 mg/L

- A. .87 lbs.
- B. 1.122 lbs.
- C. .43 lbs.
- D. 100 lbs.
- E. None of the Above

118. A 12-Volt battery operates a radio with a resistance of 4 ohms. What size amp fuse is needed? SAC V-1 sec. A.12 I #28

- A. 3 amps
- B. 30 amps
- C. 40 amps
- D. 36 amps
- E. None of the Above

119. The rate at which a wet well fills can be used to calibrate a flowmeter. The same procedure can be used to determine the capacity of a pump. Determine the pump capacity in GPM if an 8-foot-long and 6-foot-wide wet well is lowered 4 feet in 5 minutes. Assume no additional water flows into the well.

SAC V1 sec. A.12 J #35

- A. 192 GPM
- B. 1436 GPM
- C. .99 GPM
- D. 287 GPM
- E. None of the Above

120. How many cubic yards of AC paving material will be required to pave over a trench 2,400 feet long and 3 feet wide using a 3-inch-deep patch? SAC V-1 sec. A.12 H #25

- A. 66.7 cu yd
- B. 21600 cu.ft.
- C. 800 cu yd
- D. 13,464 cu yd
- E. None of the Above

121. Determine the chlorine demand of an effluent from a wastewater treatment plant if the chlorine dose is 10.0 mg/L and the chlorine residual is 1.1 mg/L. SAC V-1 A.12 G#21

- A. 18.9
- B. 11.1 mg/L
- C. 11.9 mg/L
- D. 8.9 mg/L
- E. None of the above

122. A float is dropped into a manhole to estimate the velocity of the wastewater. Two minutes and 30 seconds later the float arrives in a manhole 450 feet down stream. What is the velocity in ft/sec.?

SAC V-1 sec. A.12 B #4

- A. 3.0 ft/sec
- B. 95 ft/min
- C. 180 ft/min
- D. 450 ft/sec
- E. None of the Above

123. An industry discharges an average of 5,230 gallons per day. What is the population equivalent from this industry? Assume a population equivalent flow of 100 GPCD.

SAC V-1 sec. A.12 A #2

- A. 533 persons
- B. 53 persons
- C. 532 persons
- D. None of the above

124. Determine the flow in a 12-inch sewer flowing full if the average velocity is 2 ft/sec.

SAC V-1 sec. A.12 B #5

- A. 1.57 cu ft/sec
- B. .785 sq. in
- C. 4 cu ft/sec
- D. 113 sq. in
- E. None of the Above

125. The slope of sewer should follow the slope of the land as close as practical. Deviations from the engineered slope on a new sewer line or the natural slope of the land can pose potential problems. A potential problem that could result from this deviation could be? SAC V-1 sec. 3.42

- A. Velocities may be too high to allow solids to drop out within the pipe
- B. The sewer could become too shallow for adequate cover
- C. Backflow of materials at the elevation apex
- D. None of the above

126. Surface restoration of newly constructed lines should be scheduled?

SAC V-1 sec. 3.845

- A. Before any major rainfall
- B. After the construction is approved by the inspector
- C. As soon as the backfill has been compacted
- D. As soon as the last man is out of the hole
- E. None of the Above

127. When staking the construction of a new sewer, the surveyor stakes the line on site. To keep the backhoe operator on line and to facilitate reading the stakes, the stakes are placed on _____ foot offsets to the sewer line. SAC V-1 sec. 3.710

- A. 5-10
- B. 2-4
- C. 10-20
- D. 15
- E. None of the above

128. Before a new sewer system is put in service, the collection system construction materials and procedures are inspected by a public-owner agency. What would be the benefit of this inspection?

SAC V-1 sec. 3.80

- A. Ensures compliance with the plans, specifications, and safety regulations governing the work
- B. Allows verbal modification of plans for the sub-contractor
- C. Eliminates the need for as-built modifications
- D. None of the above

129. One important aspect of constructing collection systems is proper backfilling and compaction. The term "relative compaction" refers to? SAC V-1 sec. 3.752

- A. Type of backfill used relative to the pipe size
- B. The degree of compaction at different lifts
- C. The level of compaction obtained compared to the level possible under ideal conditions
- D. All of the above
- E. None of the above

130. The most popular chemical used for the control of hydrogen sulfide is chlorine. The chlorine is injected into the wastewater flow typically at a dose rate of: SAC V-1 sec. 6.540

- A. .20 to 1 mg/L
- B. 10 to 20 mg/L
- C. Dose rate does not apply
- D. Minimum of 100 mg/L or 75 pounds
- E. None of the Above

131. Which of the following is true concerning the selection of chemicals for the removal of grease and detergents? SAC V-1 sec. 6.43

- A. Bacterial cultures are the only approved methods of removing grease
- B. Chemicals may be very effective under specific conditions, but may not work in all conditions
- C. Chemical treatment is not a cost-effective method of cleaning sewers of grease and detergents.
- D. All of the above are true statements
- E. None of the Above

132. Hydrogen peroxide can be used as a means of chemical treatment to control hydrogen sulfide. The strength of hydrogen peroxide to be used in collection systems is approximately? SAC V-1 sec. 6.541

- A. 3 %
- B. 40 %
- C. 50 %
- D. 100 %
- E. All of the above

133. The use of iron salts (ferric chloride, ferric sulfate) can be effective in the control of hydrogen sulfide production. Dosage rates are based upon? SAC V-1 sec. 6.546

- A. The concentration of hydrogen sulfide
- B. A ratio of total iron to total sulfide
- C. Flow rates
- D. Standard range of 10-20 ppm
- E. All of the above

134. Supervisors sometimes try to choose chemicals that will make their jobs easier. But sewer cleaning chemicals have long been misrepresented. One fact about chemicals that are supposed to clear clogs is that? SAC V-1 sec. 6.410

- A. They will perform quickly and keep the system odor free
- B. They always create hazardous gases when used
- C. They breakdown and convert into a living organisms
- D. They do not unclog stoppages down the sewer line
- E. None of the Above

135. The manager or supervisor should be hesitant about buying chemicals for root control in the collection system. The manager should obtain manufacturer information that includes: SAC V-1 sec. 6.421

- A. The contact time of the chemical with the roots
- B. How to save the shrub or tree once some of its roots have been destroyed
- C. The number of employees required to do the job
- D. In case of over-feed, the FIMA reference code
- E. None of the Above

136. Lateral and branch sewers clean-outs are sometimes used in place of manholes. What disadvantage occurs when using this method? SAC V-1 sec. 3.33

- A. Street traffic on the frame and cover tend to shear the clean-out pipe below the frame
- B. Cleaning equipment and flushing line access is not provided
- C. Creates a confined space situation
- D. Allows CO₂ build up in the system

137. The depth and width of trenches should be considered during collection system design. What factors control the design width of the sewer? SAC V-1 sec. 3.45

- A. The diameter of the pipe
- B. The manufacturer of the pipe
- C. The population growth of the area
- D. The amount of flow through the pipe
- E. None of the Above

138. Designing sewer systems in an area that has curved streets is difficult. A plant manager has a curved sewer system to conform to the radius of the streets in the area. She must be aware of the pipe manufacturer's recommendation for the pipe joint's allowable? SAC V-1 sec. 3.44

- A. Weight per mile factor
- B. Load yield per foot
- C. Stress when bending
- D. Deflection
- E. Vertical opening

139. A collection system is designed for capacity of the area it serves and also for possible infiltration rates. What is the maximum infiltration rate for a well-constructed sewer in a 24-hour period?

SAC V-1 sec. Table 3.2

- A. 20 gallons per inch per mile
- B. 200 gallons per inch per mile
- C. 10 gallons per inch per mile
- D. 100 gallons per inch per mile
- E. None of the Above

140. An accurate method in finding velocities of flow in a collection system is through the use of dye. When calculating the velocity of the flow, the operator measures the time it takes for the dye to reach the manhole downstream. Who should recommend the proper type of dye to use?

SAC V-1 sec. 3.23

- A. The supplier of chemicals to the wastewater treatment plant
- B. EPA establishes that list
- C. A local government agency
- D. Recommendations are not required

141. Starters that are available without overload function provide the motor with only disconnecting means. Rather than a motor starter they are referred to as a: SAC V-2 sec. 9.24

- A. Inductor
- B. Contactor
- C. Capacitor
- D. Regulator
- E. None of the Above

142. When testing an electrical circuit for resistance, the operator may use an Ohmmeter. What type of circuit component will the operator test? SAC V-2 sec. 9.12

- A. Coils and relays
- B. Phase leads
- C. Transformer
- D. Capacitors
- E. None of the Above

143. The supervisor is trying to initiate a preventive maintenance (PM) program on the equipment in the collection system. Pump motors are a critical part of the collection system and must be operated at all times. The supervisor wants to test motor windings for insulation breakdown to predict motor failure. Which of the following instruments can be used for this type of PM? SAC V-2 sec. 9.12

- A. pH gauge
- B. Voltmeter
- C. Megger
- D. Tachometer
- E. Insulation depth monitor

144. Motor overloading causes the motor to draw current in excess of the motor nameplate current. The heat generated by continuous operation above its design rating can damage the installation. Which of the following conditions would **NOT** cause this to occur? SAC V-2 sec. 9.231

- A. Flow increase
- B. Rags and rocks
- C. Incorrect impeller size
- D. Single phasing

145. Motor and supervisory control systems found in a lift station are composed of components that require general annual maintenance. The maintenance that should be done on control transformers is:

SAC V-2 sec. 9.14

- A. Check for loose windings
- B. Check control switches for movement
- C. Check for resistance
- D. Check mechanical disconnect switch
- E. All of the above

146. Domestic wastewater flow is calculated by multiplying the estimated population in the collection system service area by the per capita flow factor. Wastewater flows from commercial and industrial areas are usually estimated in terms of: SAC V-1 sec. 3.21

- A. Gallons per day per acre
- B. Gallons per day per feet
- C. Gallons per day per person
- D. Gallons per minute per day
- E. None of the Above

147. Logarithmic scales are used for various applications (pH, pressure gauges, etc.). When reading a log scale, an increase from 7.0 to 8.0 would indicate an increase of _____ in the value represented? AC V-1 sec. 3.850

- A. 1 million
- B. 75 %
- C. 10
- D. Depends on the weather
- E. None of the Above

148. When using closed circuit TV it is recommended while the lines are being strung, the generator is started and the system tested for adequate power in volts and for proper cycles called:

SAC V-1 sec. 5.320

- A. Phases
- B. Hertz
- C. Direct current
- D. RMS
- E. None of the Above

149. Several methods or techniques are available for internal grouting or sealing of sewer pipes. Some chemicals have a strong aversion to or dislike to water. These types of chemicals are commonly known: SAC V-1 sec. 7.52

- A. Hydrophobic
- B. Hydrophilic
- C. Catalyst
- D. Molecular reactive
- E. None of the Above

150. Sealing chemicals will absorb water it needs to react, which is an equal volume. What happens to the material once the reaction occurs? SAC V-1 sec. 7.52

- A. It stays in its present state
- B. It does not mix well with water and nothing happens
- C. It becomes rigid and none flexible
- D. It expands 10 to 12 times its original volume
- E. None of the above

151. The energy grade line of any hydraulic system represents the elevation of energy head of any liquid flowing through the system. The distance between the suction energy grade line and the discharge energy grade line determines? SAC V-2 sec. 8.164

- A. The proper distance above the water for the placement of a suction lift pump
- B. The length of the screw pump
- C. The static suction height
- D. The total dynamic head
- E. None of the Above

152. Olfactory fatigue is a condition operators may experience in collection system work. This condition sometimes occurs when operators? SAC V-1 sec. 4.41

- A. Lose the feeling in their feet
- B. Lose the ability to hear.
- C. Lose emotional stability
- D. No longer detect odor with their nose
- E. Become drowsy while working

153. During a smoke test, an operator reports to you the following information:

- #2 Van Buren St. -- Smoke from sewer vents
- #3 Van Buren St. -- Smoke from gutters
- #4 Van Buren St. -- Smoke from gutters
- #5 Van Buren St. -- No smoke from vents

What can you determine from this information? SAC V-1 sec. 5.45

- A. #2 poses an inflow problem
- B. #4 has a blocked sewer vent, forcing smoke through the gutters
- C. #5 lateral sewer has a dip in it that has created a trap
- D. #3 poses an outflow problem
- E. None of the Above

154. When using compressed air to alleviate septic conditions in a wet well, what excessive aeration condition could occur to cause problems? SAC V-2 sec. 8.101

- A. There is the danger of explosion
- B. Water is introduced into a force main
- C. Roaches in the well will migrate into nearby homes
- D. Loss of control causing bodily harm to operator
- E. None of the Above

155. The occurrence of water hammer in a force main is often attributed to:
SAC V-2 sec. 8.02

- A. Excessive development of static head
- B. Inadequate closure of check valves
- C. Introduction of air into the line
- D. Lack of thrust blocks behind elbows
- E. None of the Above

156. A bubbler controlled lift station has two centrifugal self-priming trash pumps that overheat and shut down due to air locking. The bubbler system is operating and reads 3.5 psi but the wet well is very low. Which of the following is a possible cause for this problem? SAC V-2 sec. 8.324

- A. The swing check valve is forcing back pressure in the system
- B. The bubbler line is plugged or restricted
- C. The rotation of the pump is backwards
- D. Then pump inlet is plugged
- E. None of the Above

157. When figuring the lift of wastewater to a gravity sewer line with a centrifugal pump, which of the following calculations would tell you the height of the lift? SAC V-2 sec. 8.151

- A. Suction head
- B. Static head
- C. Dynamic lift
- D. Positive head
- E. None of the Above

158. Handrails, ladders, and pipe fasteners supports are set into concrete, without any protective coating they will eventually corrode. A good choice for replacing a corroded steel ladder in a wet well would be: SAC V-2 sec. 8.106

- A. A steel ladder with aluminum anchor hooks
- B. An aluminum ladder with stainless steel anchor hooks
- C. A fiberglass ladder
- D. A boom with fall protection
- E. None of the Above

159. Which of the following level controls is considered new technology? SAC V-2 sec. 8.106

- A. Electrode controllers
- B. Pulley-gear float system
- C. Micro based inductive coils
- D. Computer controlled sight tube
- E. None of the Above

160. What capacity (**CFM**) blower will be required to ventilate a manhole, which is 48 inches in diameter and 16 feet deep? The proper air exchange rate is 15 air changes per hour. SAC V-1 A.12 sec. K # 39

- A. 55 CFM
- B. 37 CFM
- C. 51 CFM
- D. 64 CFM
- E. None of the Above

161. Which of the following valves would be the best choice to replace a suction side pump valve that is continually clogging? SAC V-2 sec. 8.171

- A. Rising gate valve
- B. Non rising gate valve
- C. Double check valve
- D. Plug valve
- E. None of the Above

162. Which of the following pump layouts would have a motor shaft mounted directly to the pump impeller? SAC V-2 sec. 8.161

- A. Closed coupled
- B. Flexible shaft
- C. Progressive cavity
- D. Flexibly coupled
- E. None of the Above

163. A stuffing box that uses conventional packing requires leakage of fluid along the shaft sleeve. Lantern rings are used for what purpose? SAC V-2 sec. 8.162

- A. Provides a seal between the atmosphere and the liquid end of the pump
- B. Provides lubrication for bearings
- C. Prevents water seepage out of the stuffing box
- D. All of the above
- E. None of the Above

164. Mechanical seals are another method used in the stuffing box. When using a mechanical seal how does it receive the lubrication in the stuffing box. SAC V-2 figure 8.39

- A. Through the seal water supply
- B. Through the liquid end of the pump
- C. Through the gland
- D. No lubrication required
- E. None of the Above

165. Who should inspect a lift station after it is completed, but before it is accepted? SAC V-2 sec. 8.22

- A. Engineer
- B. Operator
- C. Supervisor
- D. None of the Above

166. Single-phase conditions cause unbalanced currents to circulate in the rotor causing increases in internal motor heating. What should the operator consider to correct this problem? SAC-WC-V2 sec. 9.231

- A. Utility may have lost phase or a fuse is blown, notify qualified parties
- B. Single-phasing is common and correct its self
- C. Problem is caused from suction loosing prime
- D. Operator should try re-tripping the breaker
- E. None of the Above

167. Collection systems managers are responsible for the continued training of collection system workers. One way that ongoing **informal** education can take place is through: SAC V-2 sec.12.330

- A. Taking classes at the local community college
- B. Attending safety seminars
- C. Reading professional magazines and papers
- D. Working toward a degree
- E. None of the Above

168. One responsibility of management is to see that personnel are properly trained for their specific tasks. Which of the following would be the best means of training a cleaning crew? SAC V-2 sec. 13.307

- A. Contact a chemical sales representative to give a presentation
- B. Training of most skills are learned on the job
- C. Conduct training exercises at a facility designed for that purpose
- D. Enroll each employee in a self-study program
- E. None of the Above

169. Maintaining a facility in the collections system is important; but when dealing with a large area with excessive travel time what should a manager consider? SAC V-2 sec.12.5

- A. Satellite yards in the system
- B. Having the crews take vehicles and equipment home
- C. Selling part of the system to nearby towns
- D. Creating a 24-hour standby crew
- E. None of the Above

170. Managers should be aware of safe practices and personal hygiene of the collection system operators. All of the following are suggested facilities to promote personal hygiene **except** for:

SAC V-2 sec. 12.520

- A. Medical clinic
- B. Outer wear wash room
- C. Showers
- D. Locker rooms
- E. All of the above

171. Managers try to make the operations and maintenance of the collection system as efficient as possible. Paperwork such as reports and records take up the manager's time. Which of the following equipment should be considered to help in the processing of paperwork? SAC V-2 sec.12.7

- A. SCADA
- B. Computer
- C. File cabinet
- D. None of the Above

172. Records concerning main line service and repair history are vital to an effective maintenance program. These records should include all the following except: SAC V-2 sec.12.5

- A. Name of the operator who performed the service
- B. Reason for maintenance activity
- C. Time taken for each activity
- D. Volume and type of debris removed during cleaning operation
- E. None of the Above

173. Managers often use probationary periods in hiring operators. It is important to document the performance of the probationary employee. Which of the following reports should be performed on the operator before the probationary period is completed? SAC V-2 sec. 12.314

- A. Mental health analysis
- B. Written evaluation of performance by the manager
- C. Public relations questionnaire sent to the customers
- D. Perform a budget analysis of the position
- E. None of the Above

174. The manager of the collection system keeps many records. One of the records is called "Main Sewer Line". This record contains mainline inventory and television history. Which of the following is another record maintained under this category? SAC V-2 sec. 12.721

- A. Main line stoppages
- B. Prevention programs to stop inflow
- C. Household drains and cleaning frequency
- D. Friction factor
- E. None of the Above

175. Personnel files are important and must be maintained by the manager. The personnel file of an operator should contain all of the following except: SAC V-2 sec. 12.721

- A. Operators personal log book
- B. Attendance records
- C. Pay records of the operator
- D. Assignments the operator performed
- E. All of the above

176. Records are more important to the operation of a collection system than some operators realize. To keep the system working in peak efficiency, the supervisor must be accountable for certain records. Which of the following is **NOT** a type of record supervisors maintain? SAC V-2 sec. 12.720

- A. Labor, such as time sheets and payroll
- B. Environmental impact records
- C. Services, such as outside repair crews
- D. Supplies, bills and purchases

177. Loud or persistent noises can damage the hearing of operators. Many old-timers have trouble hearing because of past sewer work. Operators are sometimes reluctant to wear protection, so the first step for ensuring the protection of workers is? SAC V-1 sec. 4.9

- A. Rotate workers frequently so the load noise is equally distributed
- B. Instruct operators to break every 15 minutes while using a jackhammer
- C. Establish a strict disciplinary program
- D. Ensure that adequate engineering controls are used on equipment whenever possible, provide hearing protection.
- E. None of the Above

178. Everyone must know what to do in case of a fire. In order to put out a fire the proper extinguisher must be used. Which class of extinguisher is used on metals such as magnesium or sodium?

SAC V-1 sec. 4.11

- A. C
- B. D
- C. ABC
- D. E
- E. None of the Above

179. Good records are essential for the preparation of a budget. Cost Items that should be recorded include the following **EXCEPT**: SAC V-2 sec. 12.720

- A. Labor
- B. Violations
- C. Supplies
- D. Equipment
- E. None of the Above

180. Most areas in the collection system would be considered confined. The best instrument that a supervisor could provide personnel in following safe procedures when entering manholes or other confined spaces is: SAC V-1 sec. 4.40

- A. Proper meter
- B. A flammable gas meter
- C. A multi-meter
- D. A confined space entry permit
- E. None of the above

181. Excavation can present a combination of hazards to the operators when access to the collection system is required. Whom does **OSHA** define as the person capable of identifying predictable hazards? SAC V-1 sec. 4.8

- A. Engineers
- B. Competent person
- C. Supervisor
- D. Lead backhoe operator
- E. None of the Above

182. Portable atmospheric testers are necessary to work in the collection field. These instruments are reliable if maintained and calibrated frequently. Although these meters are being used during confined space entry, the manager should require the use of?

SAC V-1 sec. 4.520

- A. A carbon dioxide analyzer
- B. Air ventilation blowers
- C. Injection of pure O₂
- D. Robotic sewer operators
- E. None of the Above

183. A **LOTO** or lockout/tagout program is essential to the safety of maintenance personnel.

A proper lockout should include all of the following except? SAC V-1 sec. 4.8

- A. Multiple locks should be used on electrical services
- B. Chain, clamp, or block equipment which could move or shift positions on the operator
- C. Shift supervisor's name
- D. Bleed, drain or block pneumatic and hydraulic lines to equipment
- E. None of the Above

184. One of the problems with poorly maintained grease traps is the decomposition of greases and the entry of this material into the collection system. Grease traps can have a horrible smell almost as bad as old dairy products or milk interceptors. If regular cleaning of the grease traps or adjoining sewer is not performed regularly, the grease will contribute to hydrogen sulfide production. Which of the following chemicals can be used to control grease and soap in the sewers? SAC V-1 sec. 6.43

- A. Enzymes
- B. Chlorine
- C. Polymer
- D. Iron salts
- E. None of the above

185. If a sewer line is structurally sound a problem associated with using a packer to seal large diameter sewer lines would be: SAC V-1 sec. 7.541

- A. Damage to the pipe from excessive amounts of sealing
- B. Over sealing can cause lack of oxygen and an increase in sulfides
- C. Packers or not recommended to use in any situation
- D. All of the above
- E. None of the Above

186. The supervisor is deciding on equipment to handle cleaning sewer lines in the system.

The past records show there are a few areas that have root problems entering the lines. All of the following methods of cleaning roots from the lines are effective **except**? SAC V-1 sec. 6.05

- A. Hydraulic jetting
- B. Hand rods
- C. Power rodders
- D. Root Control Chemical
- E. None of the Above

187. Sewer cleaning is important in keeping the hydraulic capacity at peak efficiency. If the crew is using a bucket and cables to clean a section of line, they should follow this operation by pulling a _____ through the line. SAC V-1 sec. 6.203

- A. CCTV
- B. Rubber plug of smaller diameter
- C. Root inhibitor
- D. Pipe reamer
- E. None of the Above

188. Visual inspection of a section of sewer line indicated that leaking was occurring at the pipe joints. The joints were sealed with an appropriate grout. Soon after, a section of sewer line upstream of the repaired section begins leaking profusely. The most likely explanation would be: SAC V-1 sec. 7.50

- A. Hydrostatic pressure has increased in the trench
- B. The grouting compound failed
- C. Joints not tested properly
- D. None of the above

189. During excavation, using the most suitable instructions for digging near the sewer line, the backhoe operator should stop digging with in _____ feet above the line and use a probe to determine the exact distance. SAC V-1 sec. 7.35

- A. 1.5 feet
- B. 3 feet
- C. 4.5 feet
- D. None of the above

190. Preliminary investigation of a sewer line repair is the foreman's or manager's job. The repair crew must work on a section of line with root intrusion and the site is in an easement. All of the following should be performed at the preliminary investigation **except** for? SAC V-1 sec. 7.20

- A. Locate all trees and shrubs that may need to be replaced in case of damage
- B. Take photographs of the area, of any damage too
- C. Request Bluestakes or utilities marked in area.
- D. Dig a preliminary hole at the site and examine the problem
- E. None of the Above

191. One way to prevent infiltration do to leaking joints and thereby reduce flows to the treatment plant would be to: SAC V-1 sec. 7.532

- A. Use a packer ball
- B. Crawl in and hand grout
- C. Use chemicals to treat the sewer flow for precipitation
- D. Leaking joints are not that much of a concern
- E. None of the Above

192. The older part of the system has a sewer system in which "dead heading" is found in many of the manholes. What type of manhole connections cause this problem? SAC V-1 sec. 7.712

- A. Tee-Shaped channels
- B. 30 to 60 degree bends in the channel
- C. Overhead sewer lines
- D. The invert has too great of a slope through the manhole.
- E. None of the Above

193. The collection system crew finds a buried manhole lid that is 24" below grade. It was a difficult process to find this cover. The Supervisor wants to raise the lid to grade by adding four, 6" concrete rings to the top of the eccentric cone. You think you have a better idea of? SAC V-1 sec. 7.702

- A. Remove the entire manhole and start over with a new baseplate
- B. Use the sewer dept. helicopter and lift the existing cone
- C. Remove eccentric cone and use a 2' ring and replace cone
- D. All of the above
- E. None of the Above

194. The collection system crew needs to make repairs on a sewer line in the front yard of a home on Main Street in your town. The crew chief needs to assign the work, call all utilities for location and maintain a safe working environment for the operators. The crew chief should also: SAC V-1 sec. 7.052

- A. Notify the home owner
- B. Notify all home owners in area
- C. Notify local authorities
- D. Allow the work to proceed
- E. None of the Above

195. When excavating a trench, the operator uncovers a water line that crosses the sewer line being repaired. When backfilling the trench around the water line, the operator should use? SAC V-1 sec. 7.4

- A. Sand
- B. Concrete
- C. Crushed rock bedding material, sometimes called ABC
- D. A mix of ground glass and dirt
- E. None of the above

196. The responsibility of any excavation lies with the supervisor or qualified person (competent person). This person has the authority to modify the shoring requirements for each job depending on each job's unique conditions. This person should also be: SAC V-1 sec. 7.11

- A. On the job site at all times
- B. Trained in advance CPR
- C. Able to handle other jobsites and keep accurate records
- D. All of the above
- E. None of the Above

197. Guidelines for trenching and shoring often refer to the "angle of repose". This term represents?

SAC V-1 sec. 7.10

- A. The width of the street divided by the invert of the pipe
- B. The angle of compacted soil
- C. The angle of a slope from the horizontal
- D. All of the above
- F. None of the Above

198. A new line is being installed and the construction crew must cross over an existing utility cable. Which of the following types of pipe is used when crossing another utility?

SAC V-1 sec. 7.4

- A. Vitrified clay pipe
- B. Ductile iron pipe (DIP)
- C. Copper or lead pipe
- D. Schedule 400 PVC pipe
- E. None of the Above

199. After installation of a service connection, the operator should complete a service line location card. Besides the location of the tap, which of the following should be included on the card?

SAC V-1 sec. 7.28

- A. County mapping codes
- B. Customer's name, history, and tax code information.
- C. Pipe size, type and cleanout location.
- D. None of the above
- E. None of the Above

200. Some excavation materials are impossible to slope because of the location or it may not be practical. Under these circumstances, you must use solid sheeting methods. What type of timber methods can be used in this case? SAC V-1 sec. 7.143

- A. Any left-over construction sheets
- B. Pine wood that only has a few knots
- C. Full dimension rough cut timber
- D. Cross braces without timber
- E. All of the above

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