Texas Water Utilities Association

COLLECTIONS - ADVANCED

Study Material

The following study questions were developed to assist the operator in the preparation process for taking a state licensing exam. While we feel the questions provide a broad sample of the type of questions one might expect on the state exam. TWUA and staff in no way implies, guarantees, or suggests that an operator who uses, studies, or knows the following material will pass the state exam. The following is only intended to offer an additional study tool.

TWUA staff have proofed the questions and answers. It is possible however that some of the answers could be found in conflict with written materials. If you doubt or question the answer key PLEASE refer to written materials and use the answer that YOU feel best fits the question.

We hope that you will find this study guide useful and we wish you the best of luck on your state exam.

These study questions **ARE NOT** actual TCEQ exam questions.

Several of the following questions were derived from reading the most recent TAC Chapter 217 Rules and Regulations regarding design.

For the advanced collections exams there can be questions asked of any of the Basic Wastewater Materials, Safety, and Anything covered in the Collections Manual – basically anything from the required core classes.

1. Wastewater commonly found in the collection system can be harmful to human health in two ways –
    a. It may contain disease causing organisms & unknown chemicals
    b. It may contain disease causing organisms & illegal nuclear waste
    c. It may contain disease causing organisms & storm runoff
    d. It may contain infectious organics & abnormal grit
    e. It may contain infectious inorganics & abnormal grit

2. Diseases are caused by a variety of organisms that enter the human body such as –
    a. Protozoa, virus, rickettsia, fungi, & cryptosporidium
    b. Bacteria, virus, rickettsia, & acids
    c. Bacteria, protozoa, virus, rickettsia, & fungi
    d. Virus, rickettsia, fungi, & petroleum products
    e. Both a & c

3. Disease causing organisms are called -
    a. Enzymes
    b. Pathogens
    c. Amoebic
    d. Bacteriological
    e. All the above

4. The state agency responsible for the oversight of wastewater collection and treatment is –
    a. Texas Water Quality Board
    b. Texas Water Development Board
    c. Texas Department of Health
    d. Texas Commission on Environmental Quality
    e. Texas Section of EPA

5. In Texas the "preferred method" of backflow prevention is –
    a. Physical Air Gap
    b. Testable Double Check Valve
    c. Testable Reduced Pressure Zone Valve
    d. Weighted Atmospheric Breaker Valve
    e. All plumbing installed by a licensed plumber

6. When referring to disease transfer the term "fecal-oral" means –
    a. Infectious blood from one human comes in contact with a cut of another
    b. Non-infectious waste comes into contact with treated drinking water
    c. Disease from Aquatic life comes into contact with treated drinking water
    d. Infectious stool from one human comes in contact with the mouth of another
    e. Productive cough from one human is transfers bronchial infection to another

7. There are several ways to accomplish disinfection of wastewater such as –
    a. Chlorination, U.V. Radiation, & Extended Aeration
    b. Chlorination, U.V. Radiation, & Ozonation
    c. Chlorination, U.V. Radiation, & Reverse Osmosis (RO)
    d. Chlorination, U.V. Radiation, & Membrane Filtration
    e. Both b & d

8. Wastewater Collection and Treatment systems must comply with state standards and guidance. This current rule can be found in –
    a. TAC Chapter 26
    b. TAC Chapter 30
    c. TAC Chapter 217
    d. TAC Chapter 290
    e. None of the above

9. Each person who directly supervises wastewater collection system operation or maintenance crews is required to be either a licensed wastewater collection system operator or a licensed wastewater treatment plant operator. A Class II Collection license is valid for flows between –
    a. 0 and 100,000 GPD
    b. 10,000 and 100,000 GPD
    c. 0 and 1,000,000 GPD
    d. 0 and 1,500,000 GPD
    e. 10,000 and 1,000,000 GPD

10. A Class II Collections License requires _____ yrs. experience and _____ hours of training –
    a. 1 yr & 20 hours
    b. 1 yr & 60 hours
    c. 2 yrs & 20 hours
    d. 2 yrs. & 30 hours
    e. 2 yrs. & 60 hours

11. In reference to the Joints for Gravity Flow Pipe – the primary purpose for specific requirements is to –
    a. Prevent Grit & Chemical intrusion
    b. Prevent infiltration and root entrance
    c. Prevent exfiltration and confine bacteriological concerns
    d. Provide a secure method for disposal of radiological waste
    e. Provide job security for the collection worker

12. Current requirements indicate that all pipe joints must be –
    a. Mechanical joint, welded, compression or threaded
    b. Include rubber gasket, compression joint, be welded, or heat fused
    c. Plastic cemented, welded, or compression joint
    d. Threaded, rubber gasket, heat fused, or soldered
    e. Rubber gasket or heat fused is the only acceptable methods

13. All potable water lines and wastewater lines MUST have a minimum of _____ feet separation –
    a. 5 feet
    b. 7 feet
    c. 9 feet
    d. 10 feet
    e. No such requirement

14. Wastewater can be corrosive and deteriorate piping and components. Internal piping components must have a lining or be resistant and have structural integrity for a minimum of _____ year life cycle –
    a. 20 years
    b. 30 years
    c. 40 years
    d. 50 years
    e. No such requirement

15. The minimum diameter allowed for a gravity flow sewer main line is –
    a. 4 inch
    b. 6 inch
    c. 8 inch
    d. 10 inch
    e. 12 inch

16. When designing a wastewater collection system the hydraulic capacity should include –
    a. Peak flow of domestic sewage, peak flow of industrial waste, & maximum infiltration rates.
    b. Peak flow of commercial sewage, peak flow of industrial waste, & expected infiltration rates.
    c. Expected daily flow, expected flow of commercial and industrial waste, & expected infiltration rates.
    d. Daily average flow of all residential, commercial, & industrial waste & expected I & I rates.
    e. Peak flow of domestic sewage, peak flow of industrial waste, maximum infiltration rates & 20 year life expectation for industrial growth

17. All wastewater collection systems must contain line slopes sufficient to allow a velocity when flowing full of not less than –
    a. 1.0 feet per second
    b. 2.0 feet per second
    c. 4.0 feet per second
    d. 5.0 feet per second
    e. 10.0 feet per second

18. Inverted Siphons and Sag Pipes MUST be a minimum of _____ inches in diameter
    a. 3 inches
    b. 4 inches
    c. 6 inches
    d. 8 inches
    e. No such requirement

19. In wastewater the term "Greywater" is meant to include and identify –
    a. Water from dishwashing machines, showers, tubs, & sinks
    b. Water from any household use that does not have organic loading
    c. Water from and household use that does not have grit
    d. Water from washing machines, showers, tubs, & sinks
    e. Water from any household use that does not have inorganic loading

20. Municipal and Industrial waste are typically classified as –
    a. Nonpoint Source
    b. Point Source
    c. Caustic Source
    d. Community Source
    e. Combined Source

21. Inflow sources typically found by smoke testing are best described as –
    a. Sanitary sewers, rain gutters & pipe defects open to the surface
    b. Storm sewers, Roof & rain gutters & pipe defects open to the surface
    c. Storm sewers, Sand Traps, Grease Traps
    d. Customer sewer taps, storm sewers, Sand Traps & R.V. dump sites
    e. Both a & d

22. If the lift station in your collection system does not have flow measuring devices it is possible to get an accurate flow by –
    a. Asking the design engineer
    b. Asking the provider of pumping equipment
    c. Verifying pump data plate for GPM & recording pump run times each 24 hrs.
    d. Verifying pump data plate & estimating electrical consumption
    e. Estimating pump flow & recording run times each 24 hrs.

23. Stormwater and Agricultural runoff would be classified as –
    a. Nonpoint Source
    b. Point Source
    c. Combined Source
    d. Caustic Source
    e. Caustic Source

24. Sanitary sewers should NOT have inflow or infiltration that exceeds –
    a. 50 gallons per inch of pipe diameter per mile of main line
    b. 100 gallons per inch of pipe diameter per mile of main line
    c. 200 gallons per inch of pipe diameter per mile of main line
    d. 250 gallons per inch of pipe diameter per mile of main line
    e. 400 gallons per inch of pipe diameter per mile of main line

25. If you work for an entity that has a population of 5,500. What would be the approximate total pound of BOD received at the treatment facility each 24 hours –
    a. 935
    b. 5,500
    c. 9,350
    d. 93,500
    e. None of the above

26. If your collection system has a "Drop Manhole" what type of device or structure would this be –
    a. A typically very deep manhole is installed to receive flow from a force main,
    b. A structure where two pipes intersect at different levels – the flow in the upper level is directed toward the bottom through a secure pipe.
    c. A manhole that over time has sunken to below grade and must be brought back to ground level.
    d. A portable structure that is temporally installed next to an existing manhole that is taken out of service for rehab.
    e. A device designed to take the place of an onsite septic system

27. The use of concrete pipe in collections systems is a must for large diameter mains but the GREATEST disadvantage would be –
    a. It is hard to seal the joints and infiltration is an issue
    b. It is difficult to install at proper grade because of its weight
    c. It has a short life expectancy and must be replaced regularly
    d. It is susceptible to hydrogen sulfide gas attack & can be weakened
    e. Both c & d

28. Which State or Federal Agency is responsible for establishing and enforcing rules and regulations related to trenching & excavation safety –
    a. Texas Digg Tess
    b. The Texas Railroad Commission
    c. The Texas Commission on Environmental Quality
    d. The Occupational Safety & Health Administration
    e. Each entity is responsible for establishing its own standards

29. There are two common methods for establishing grades when installing collection lines –
    a. 8 foot steel bubble level and Line Transit
    b. String & Grade Rod and the use of Laser Levels
    c. Survey Transit and Laser Lever
    d. Handheld GPS unit and Line Transit
    e. Tape measure and Line Transit

30. One of the MOST critical aspects of installing new collection lines is –
    a. Proper Bedding
    b. Using approved Backfill Materials
    c. Using a Mandrel Tool in the line to assure there is NO deflection
    d. Disinfecting the line with 50mg/L Chlorine
    e. Deciding if the main will be in the alleyway or street

31. When installing main line it is common practice to lay _____ and bells will be facing _____
    a. Downhill and Upstream
    b. Uphill and Downstream
    c. Uphill and Upstream
    d. Downhill and Downstream
    e. Whatever personal preference and Upstream

32. There are Three Main reasons for the installation of a lift station –
    a. Natural grade is too shallow, Hydraulic gradient would produce too much head pressure and velocity, and when line is too long to treatment facility
    b. Topography and grade make gravity flow impossible, Hydraulic gradient would produce insufficient head for gravity flow, and When it is necessary to boost or lift the flow over a rise.
    c. Intersections of main feeder lines, Flows would overcome typical manhole structures, and when infiltration exceeds allowable standards.
    d. When higher end subdivisions want their discharge removed rapidly, When natural grades are too shallow, and when treatment facilities are more than 5 miles from last customer tap.
    e. When crossing a river or stream, When commercial food processors are customers, and when there is a sever change in elevations.

33. There are two basic designs or types of lift stations –
    a. Submerged and Elevated
    b. Hydro-pneumatic and Forced Air Induction
    c. Wet Pit and Wet Pit / Dry Pit
    d. Open pit and Closed Pit
    e. Both b & c

34. When referring to pumps the term “static head” is used – what is this referring to –
    a. Horsepower needed to overcome all Infiltration
    b. Reserve capacity of pumps as specified by the pump curve
    c. The vertical distance between the liquid in lowest portion of the structure to the liquid at the highest point of discharge.
    d. The difference between the lowest point of discharge and midline of the pumping structure
    e. Only applies to ground water well applications

35. If the lift station in your collection system is designed with two pumps the pumps should –
    a. Both be rated at the same capacity & each capable of handling all flows
    b. One should be larger and considered primary & the other smaller and only runs to accommodate peak flows.
    c. One should be considered a grinder pump the other a sump pump
    d. Be a submersible and the other a centrifugal
    e. One should be 480 volt AC and the other 240 volt DC to operate with a generator in the event of a power failure.

36. Possibly the MOST important characteristic(s) of a wastewater pump is –
    a. Longevity & Freedom of maintenance
    b. Reliability & Freedom of clogging
    c. Initial costs & Reliability
    d. Corrosion Resistance & Ability to pass solids
    e. Ease of maintenance & repair parts

37. When referring to pumps and motors the term "Brake Horsepower" is –
    a. The actual plus reserve horsepower required to operate the pump at a specific head
    b. The actual horsepower needed to overcome all friction plus the specific head
    c. The reserve power needed to shut down the motor without causing a water hammer.
    d. The actual horsepower required to operate the pump at a specific head
    e. The calculated horsepower required to operate the pump efficiently

38. If the operator is told that a pump is cavitating – this pump would be –
    a. Pumping grit and making a pinging sound
    b. Partially plugged and needs to be serviced
    c. Vibrating excessively and probably has a bad bearing
    d. Air locked and at risk of damaging the mechanical seals
    e. Temporally pumping more water than is being supplied

39. The MOST critical part of a submersible pump is –
    a. The bead of silicone that seals the motor from all moisture
    b. The mechanical seal between the motor and the volute (pump housing)
    c. The proper sizing of the impeller and motor brake horsepower
    d. The guide rods that keeps the pump upright & proper voltage
    e. The manual prime accessory and the installation circuit breakers

40. Excessive power consumption at a lift station COULD indicate –
    a. Partially clogged impeller
    b. Improperly sized packing gland
    c. Gate valve on suction side of pump is broke open
    d. Check valve on suction side of pump is broke open
    e. Mechanical seals on pump shaft undersized

41. Proper sizing of electrical fuses or breakers in the electric panel would be –
    a. 100 % of motor nameplate ampers at full load
    b. 125 % of motor nameplate ampers at full load
    c. 150 % of motor nameplate ampers at full load
    d. Twice the electric motor rated ampers + 10 %
    e. Fuse sizing is based on Volts not Amps

42. In wastewater collection or treatment the term "Flow Equalization" refers to –
    a. The interception of liquids during high or peak flow situations and temporally storing this liquid to be introduced back to the flow at minimum flow
    b. The adding of liquids necessary to calculate peak loading
    c. The automatic re-routing of liquids to another pump station when flows exceed lift stations rated capacity.
    d. The term used to describe the reserve storage capacity needed at all lift or transfer stations
    e. The end result of adding a Variable Speed Controller at lift stations so that flows can better be regulated.

43. The operator can achieve some degree of success in the treatment of odors at lift stations by the injection of –
    a. Chlorine
    b. Hydrogen Peroxide
    c. Liquid Enzymes
    d. Copper Sulfate
    e. Both a & b

44. Practically ALL sewer collection and treatment facility <u>problems</u> can be traced to –
    a. Over loading, Poor Construction, No maintenance, & No Licensed Operator
    b. Misuse, Bad design, Poor Construction, & Faulty Materials
    c. Unanticipated growth, Bad design, & Poor Maintenance
    d. Neglect, Bad design, Poor Construction & Inadequate funding
    e. All the above

45. One method to correct inflow and infiltration in collection system lines is –
    a. Pressure Cementing existing mains and in line drilling to make a new line
    b. The process of pressure injecting liquid fiberglass to affected areas
    c. Heat shrinking a PVC liner over the existing main lines
    d. Slip Lining existing mains
    e. All the above

46. _____ & _____ are the two MOST common pieces of equipment used to clean and unstop sewer main lines –
    a. Chemicals & High Pressure Water Jet Machines
    b. Chemicals & Rodding Machines
    c. Rodding Machines & High Pressure Water Jet Machines
    d. Cable and Auger & Horizontal Boring
    e. Rope and Bucket & Water Pressure from Fire Hydrants

47. As an operator you are supervising the video inspection of sewer mains. In one particular section of line you notice tree roots growing into the main – One chemical that could be added to assist in the control of roots would be –
    a. Polymers
    b. Hydrogen Peroxide
    c. Sodium Hypochlorite
    d. Liquid Oxygen
    e. Copper Sulfate

48. Most of the time excessive odor in the lift stations and collection systems indicate –
    a. The waste being collected and pumped has become septic
    b. The waste being collected and pumped needs to be circulated
    c. The waste is becoming facultative and should be directed to holding ponds
    d. The waste is more solids than liquids and should be diluted with water
    e. There is a break in the main line and repairs are required

49. By definition a "Confined Space" is –
    a. A open circular or square holding device with limited access and not intended for humans
    b. Any container with limited access but presents no danger for human occupancy
    c. Any space with limited or no ventilation, Limited access or exits, & Not intended for human occupancy
    d. Any basin or device designated and labeled by OSHA and TWDB
    e. A safety concern but typically wastewater personnel will seldom come in contact

50. When installing shoring equipment it should start _____
    a. At the bottom of the trench and be installed toward the top
    b. Above the top of the trench and installed toward the bottom of the trench
    c. With the first scoop of the backhoe and installed as directed by supervisor
    d. Once the trench reaches 7' deep and is set in place with a Crain
    e. Only if the ditch is waterlogged and stability is questioned

51. Steps in manholes are no longer allowable due to –
    a. Added expense of construction and poor investment of public funds
    b. Falls and lawsuits toward entities and manufacturers
    c. Chemicals and gases causing corrosion and deterioration
    d. Steps cause the rodding cable to tangle at times creating a hazard
    e. No uniformity in size or materials used in construction

52. Current design criteria indicates that all new manholes must be _____ in diameter with a _____ passageway opening –
    a. 36 inches & 36 inch opening
    b. 36 inches & 48 inch opening
    c. 48 inches & 24 inch opening
    d. 48 inches & 30 inch opening
    e. 48 inch and 36 inch opening

53. In the past it was thought that storm water runoff would help clean main lines & it was common practice to connect storm sewers with collection lines – today this practice is –
    a. Acceptable by the state regulatory authority
    b. Strictly Prohibited
    c. Acceptable but entity MUST provide screening to keep large items out
    d. Acceptable as long as flow is measured accurately and recorded
    e. Acceptable as long as grab samples are taken

54. If you were installing two miles of 8" PVC sewer main and the line was relatively straight – what would be the maximum distance between required manholes –
    a. 300 Feet
    b. 400 Feet
    c. 500 Feet
    d. 750 Feet
    e. 1,000 Feet

55. If you were installing two miles of 24" reinforced concrete main and line was relatively straight – what would be the maximum distance between required manholes –
    a. 400 Feet
    b. 500 Feet
    c. 800 Feet
    d. 1,000 Feet
    e. 1,200 Feet

56. All newly installed manholes are required to be tested for leakage – the maximum leakage acceptable is –
    a. 0.025 gallons per foot diameter / per foot of depth / hour
    b. 2.5 gallons per foot diameter / per foot of depth / hour
    c. 2.5 gallons per foot diameter / per foot of depth / 24 hours
    d. 10 gallons per 24 hours regardless of depth
    e. 100 gallons per 24 hours regardless of depth

57. In a lift station Gate Valves and Check Valves are _____ in a wet well configuration –
    a. Required
    b. Acceptable as long as they have extended shafts for easier operation
    c. Acceptable as long as the enter working parts are plastic coated
    d. Prohibited
    e. Necessary but seldom installed during initial construction

58. In a "Dry Well" lift station configuration air ventilation equipment is required and if used under INTERMITTENT operating conditions this ventilation equipment must be capable of exchanging the air _____ times per hour and connected to the lift stations lighting system.
    a. 6 times per hour
    b. 12 times per hour
    c. 24 times per hour
    d. 30 times per hour
    e. None of the above

59. All Force Mains MUST terminate either _____ or at the _____
    a. At a Manhole / WW Treatment Facility
    b. At a Interceptor Box / Drop Manhole Facility
    c. At a Manhole / Chlorine Contact Stabilization Facility
    d. At a Wet Lift Station / Primary Treatment Facility
    e. At a Main Line Twice the Diameter of the Force Main / WW Treatment Facility

60. A pressure test of the force main is required before placing into service. The psi for this test is –
    a. 25 psi over pipe rating
    b. 25 psi over normal operating pressure
    c. 50 psi over pipe rating
    d. 50 psi over normal operating pressure
    e. Not required for entities under 3,300 population

61. Operators and workers should NOT enter a manhole or similar structure without first –
    a. Notifying supervisor and properly displaying traffic control devices
    b. Notifying OSHA that you have a confined space situation and wait for entry number
    c. Testing the air and using forced air ventilation
    d. Wearing an approved SCBA and Implementing Anti Fall Safety Equipment
    e. All the above

62. Anytime the Operator or Workers is exposed to or has the potential to be exposed to waste he / she should have and use appropriate personal protective equipment such as –
    a. Hard hat, Rubber gloves, Rubber boots, Eye protection, Protective clothing**,**
    b. Hard hat, Rubber gloves, Rubber boots, Eye protection, and cell phone
    c. Cap, flip flops, disposable gloves, Sun glasses, Walkman & SCBA
    d. Work uniform, Hard hat, disposable plastic gloves, hand sanitizer & ear plugs
    e. Nose plug, Hard hat, Rubber boots, & Rain slicker

63. You are notified that the Lift Station at intersection X is not functioning. If you have not been properly trained in trouble shooting electrical issues or have the proper diagnostic equipment the MOST appropriate action by the operator or worker would be –
    a. Upon arrival open the disconnect panel and make sure the fuses are good
    b. Upon arrival open the disconnect panel & close in the switch so that voltage can be verified
    c. Upon arrival reset all external breakers and notify the power company and an electrician – wait.
    d. Upon arrival take standard "pig tail & 200 watt bulb" and test the fuses & incoming line voltage
    e. Notify supervisor that you have not been trained but have the necessary diagnostic equipment and feel comfortable in opening the electrical panels for investigation.

64. You are using Gas Chlorine at one of the Lift Stations and when you arrive you immediately smell the strong odor of chlorine – you should
    a. Hold breath and enter the room to shut off the gas chlorine cylinder
    b. Put on respirator and quickly close valve on chlorine cylinder
    c. Tell the new bee that he needs to hold his breath and quickly close the valve
    d. Put on SCBA and make sure there is a second person on scene when you enter room and close the valve on the cylinder
    e. Notify TCEQ that you possibly have a terroristic threat situation

65. As an operator you have been on the scene working on rehab for an old brick manhole. The manhole is located in one lane of traffic on a busy street. You have been testing the air and using a forced air ventilator for each entry and have not detected any dangers. You have re-grouted the inlet and outlet line and have a temporary plug in the inflow line. It has been 2 ½ hours since you were last in the structure – it is time to remove the temporary plug; you should –
    a. Assume that entry will be safe since no dangers have been recorded
    b. Hold breath and quickly enter and remove the plug
    c. Threat the entry just like it is the first and test air & ventilate the structure
    d. Assume that Carbon Monoxide from passing cars could have settled in the bottom
    e. Both c & d

66. Your main lift station is pumping 5.2 MGD – what is the flow in Gallons Per Minute –
    a. 2,166
    b. 3,611
    c. 36,111
    d. 8,666
    e. 86,666

67. A Class III Collections License requires _____ yrs. experience and _____ hours of training –
    a. 1 yr & 60 hours
    b. 2 yrs & 20 hours
    c. 2 yrs. & 30 hours
    d. 3 yrs. & 60 hours
    e. 5 yrs. & 100 hours

68. All Collection License are good for _____ yrs. and require _____ hours of continuing education within the specified time.
    a. 2 years & 20 hours
    b. 2 years & 30 hours
    c. 3 years & 20 hours
    d. 3 years & 30 hours
    e. Class III is a perpetual license – no CE is required

69. Typically the suction piping for all sewer pumps should be at least _____ than the pump suction –
    a. One pipe size larger
    b. One pipe size smaller
    c. Two pipe sizes larger
    d. Two pipe sizes smaller
    e. Equal to the pumps suction

70. Most odors in sewer systems comes from gases when wastewater becomes _____
    a. Infected with disease causing bacteria
    b. Mixed with storm runoff
    c. Septic
    d. Confined to long runs in a high pressure force main
    e. Both a & c

71. Factors that could contribute to excavation site failure are –
    a. Inexperienced equipment operators, Over Sloping, & Vibrations and shock
    b. Changing weather conditions, Superimposed loads, & Vibrations and shock
    c. Other utility lines, weather, Over Sloping, & Vibrations and shock
    d. Soil compaction, Superimposed loading, Vibrations and Shock
    e. Failure to call Digg Tess, Over Sloping, Improperly located utility lines

72. If your lift station is equipped with a "Four–Float" Control System – what specifically do these floats control –
    a. Lowest – All pumps on; Next higher – Lag pump on; Next higher – Lead pump on; Highest – High level alarm
    b. Lowest – All pumps off; Next higher – Lead pump on; Next higher – Lag pump on; Highest – High level alarm
    c. Lowest – All pumps off; Next higher – Lead pump on; Next higher – Lag pump on; Highest – All pumps on
    d. Lowest – All pumps off; Next higher – All pumps on; Next higher – High Level Alarm; Highest – Auto dialer for emergency need for immediate maintenance
    e. Lowest – All pumps off; Next higher – Lag pump on; Next higher – Lead pump on; Highest – High Level Alarm

73. You have a gas chlorinator that is running at 10.4 pounds per 24 hours. Approximately how many days will a 150 Lb. cylinder last –
    a. 14 days
    b. 16 days
    c. 24 days
    d. 240 days
    e. Not enough information to compute

74. In some of the smaller systems there may be a pumping device called a "pneumatic ejector" This device is low flow and works on the principle of –
    a. In line positive displacement pump
    b. Small grinder pump type
    c. Air compressor and pressure tank
    d. Venturi effect from being connected in line to a force main
    e. High Head Submersible

75. In your collection system there are places where sewer main lines are not available. In this area some customers have a "package design style" self contained pumping unit, the pumps specified with all units are "Grinder" pumps – what type of pumps will be in these facilities –
    a. A positive displacement pump with a device similar to a garbage disposal that chops up solids before passing through the pump and discharges under low to moderate pressure to a receiving main.
    b. This is simply a centrifugal pump with an electronic breaking device that keeps the unit from causing a water hammer.
    c. Grinder refers to a noise made when pumping unit is in need of maintenance
    d. A centrifugal pump with a device similar to a garbage disposal that chops up solids before passing through the pump and discharges under low to moderate pressure to a receiving main.
    e. Both b & c

76. Force Mains must be at least _____ inch in diameter and piping and fittings must have a pressure rating of at least _____.
    a. 3 inch & 100 psi
    b. 3 inch & 150 psi
    c. 4 inch & 100 psi
    d. 4 inch & 150 psi
    e. 6 inch & 200 psi

77. The MOST common types of pipe used in the Collections System today are –
    a. Vitrified clay, Aluminum, Concrete, & PVC
    b. Vitrified clay, PVC, Concrete, & Ductile Iron
    c. PVC, Fiber Board, Aluminum, & Concrete
    d. Fiberglass, Continuous Lay Poly, Concrete, & PVC
    e. Vitrified clay, Fiber Board, PVC, Galvanized,& Concrete

78. All Lift Stations MUST have automatic controls – the most common methods for controlling lift station pumps and motors are –
    a. Floats, Electrodes, LED, & Pressure
    b. Floats, Electrodes, Bubblers, & Acoustic
    c. Mercury Vapor bulb, LED, & Acoustic
    d. Electronic times, Floats, Electrodes & Laser level
    e. All the above

79. The State Regulatory Authority relies on _____ as authority to Set Water Quality Standards, Set Rules for Waste Discharge, Establish Water Quality Monitoring, & Develop a Water Quality Control Plan –
    a. TAC- Chapter 26 – Texas Water Code
    b. TAC- Chapter 30 – Texas Water Code
    c. TAC – Chapter 290 – Texas Water Code
    d. TAC – Chapter 310 – Texas Water Code
    e. TAC – Chapter 311 – Texas Water Code

80. All pumps in the Collection System must have a _____ valve on the Discharge Side of the pump –
    a. Electronic Actuated Gate Valve
    b. Butterfly Valve
    c. Gate Valve
    d. Check Valve with weighted arm
    e. Either b or d

81. Pipe less than 27 inches in diameter MUST be tested for deflection using a rigid Mandrel. This tool must equal _____ percent of the outside pipe diameter being tested –
    a. 75 %
    b. 80 %
    c. 85 %
    d. 90 %
    e. 95 %

82. Your "Wet Well" in a lift station is 24 feet in diameter and is 28 feet deep. If this structure is completely full how many gallons of liquid will it hold –
    a. 94,700
    b. 120,637
    c. 126,600
    d. 378,880
    e. Not enough information to compute

83. For the above problem if the flow into this same wet well is 600 GPM how long in hours will it take to completely fill this structure –
    a. 2.6 hours
    b. 3.3 hours
    c. 3.5 hours
    d. 6.31 hours
    e. 10.5 hours

84. You are installing 750 feet of 8 inch main line. The trench is 30 inches wide and is 60 inches deep – how many cubic yards of material will be excavated -
    a. 34.7 yards
    b. 50 yards
    c. 347 yards
    d. 3,470 yards
    e. None of the above

85. Using the numbers for the above problem (750' X 30"X 60") – If you were instructed to use mortar sand for the first 24 inches of the backfill - how many yards would you order –
    a. 13.8 yards
    b. 50.0 yards
    c. 69.0 yards
    d. 138 yards
    e. None of the above

86. At a large car wash facility they have a sand trap that measures 24 feet long X 14 feet wide X 6 feet deep. If this trap is ¼ full of sand how many yards of sand is in the structure –
    a. 1.86
    b. 18.6
    c. 186
    d. 28
    e. 288

87. The effluent pipe diameter leaving your facility is 16 inch. There is 7,200 feet of this line. Assuming the pipe is full – how many gallons of water will there be in the line -
    a. 736
    b. 7,366
    c. 73,663
    d. 736,663
    e. None of the above

88. If you are feeding 26 pounds of 100 % chlorine per day – how many pounds of .65 % HTH would you have to use to equal the same amount –
    a. 40
    b. 43
    c. 50
    d. 65
    e. 165

89. Your collection system has a section of main line stopped up – the main is 16 inch diameter and you determine there is 1,200 feet of main affected - in addition to the main line there are 4 manholes 4 feet in diameter that are standing an average of 14 feet deep. Once the blockage is cleared – approximately how many gallons of sewage will be headed toward the treatment facilities -
    a. 13,577 gallons
    b. 17,538 gallons
    c. 42,846 gallons
    d. 46,807 gallons
    e. 428,380 gallons

90. ***BONUS QUESTION*** – Using some of the information from the above question – Assuming you have the same 16 inch main and it will be flowing full also the velocity of flow after you clear the stoppage is 6 feet / second – ***HINT Q=VA***

    a. WHAT IS THE FLOW IN GPM -
        i. 48.7 gpm
        ii. 285 gpm
        iii. 3,689 gpm
        iv. 5,589 gpm
        v. You're Kidding, right ! ! ! !

    b. WHAT IS THE TIME TO EMPTY STOPPAGE IN MINUTES -
        i. 3.1
        ii. 4.75
        iii. 61.5
        iv. 360
        v. You're still kidding – right ! ! ! !