Texas Water Utilities Association

COLLECTIONS II

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.

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 current agency responsible for the oversight of wastewater collections 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 Arm Check 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 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
    d. Chlorination, U.V., Radiation, & Membrane Filtration
    e. Both b & c

8. Wastewater Collections and Treatment systems must comply with state standards and guidance. The 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 systems 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 Collections License is valid for flows between –
    a. 0 and 100,000 GPD
    b. 10,000 and 1,000,000 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 & Root Intrusion
    c. Prevent exfiltration and confine bacteriological concerns
    d. Provide a secure method for disposal of radiological waste
    e. Provide job security for collection workers

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 are the only acceptable methods

13. All potable water lines and wastewater lines MUST have a minimum of ____ feet separation –
    a. 5 feet
    b. 6 feet
    c. 7 feet
    d. 9 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 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 and expected infiltration rates
    d. Daily average flow of all residential, commercial, and industrial waste and expected I & I rates
    e. Peak flow of domestic sewage, peak flow of industrial waste, maximum infiltration rates and 20 year life expectation with anticipated growth

17. ALL wastewater collection systems must maintain 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. 3.0 feet per second
    d. 4.0 feet per second
    e. 5.0 feet per second

18. Inverted siphons and sag pipes MUST be a minimum of _____ inches in diameter
    a. 3 inch
    b. 4 inch
    c. 6 inch
    d. 8 inch
    e. No such requirement

19. In wastewater the term “Grey water” 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 stations
    e. Both a & d

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

23. Storm water and Agricultural runoff would be classified as –
    a. Nonpoint source
    b. Point source
    c. Combined source
    d. Caustic source
    e. None of the above

24. Sanitary sewers should NOT have inflow or infiltration that exceeds –
    a. 100 gallons per inch of pipe diameter per mile of main line
    b. 200 gallons per inch of pipe diameter per mile of main line
    c. 250 gallons per inch of pipe diameter per mile of main line
    d. 400 gallons per inch of pipe diameter per mile of main line
    e. 500 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 pounds of BOD received at the treatment facilities 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 below grade and must be brought back to ground level using grade rings.
    d. A potable 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 collection 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 and can be weakened
    e. Both c & d

28. Which Federal or State agency is responsible for establishing and enforcing rules and regulations related to trenching and excavation safety –
    a. Texas Digg Tess
    b. Texas Railroad Commission
    c. 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 survey transit
    b. String & grade rod and the use of laser levels
    c. Survey transit and laser level
    d. Handheld GPS unit and survey transit
    e. Tape measure and survey 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 50 mg/L chlorine
    e. Deciding if the main will be in the alley or street

31. When installing a 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 the design engineer specs and contractor preference

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, flow would overcome typical manholes 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 the 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 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 pump as specified by the pump curve
    c. The vertical distance between the liquid in the 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 a 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 the primary and the other smaller and only runs to accommodate peak flows.
    c. One should be considered a grinder pump and the other a sump pump
    d. One should be 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 prolonged power outage.

36. Possibly the MOST important characteristic(s) of a wastewater pump is –
    a. Longevity and ability to pass solids
    b. Reliability and freedom of clogging
    c. Initial costs and reliability
    d. Corrosion resistance and ability to pass solids
    e. Ease of maintenance and 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 specific head
    b. The actual horsepower needed to overcome all friction plus the specific head
    c. The reserve horsepower 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 clogged 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 pump housing
    c. The proper sizing of the impeller and motor brake horsepower
    d. The guide rods that keep the pump upright & proper voltage
    e. The manual prime accessory and the installed circuit breaker

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 are undersized

41. Proper sizing of electrical fuses or breakers in the electrical 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 collections 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 flows
    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 be better 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 problems can be traced to –
    a. Overloading, 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 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 station and collection system 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. The definition of 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 designed 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. At 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 the supervisor
    d. Once the trench reached 7 feet deep and is set in place with a Crain
    e. Only if the ditch is waterlogged and stability is questioned

51. Steps in a manhole 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 cause corrosion and deterioration
    d. Steps cause the rodding cable to tangle at times causing a hazard
    e. No uniformity in size or materials used in construction

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

53. In the past it was thought that storm water runoff would help clean main lines and it was common practice to connect all 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 is 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 the line is 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 / per hour
    b. 2.5 gallons per foot diameter / per foot of depth / per hour
    c. 2.5 gallons per foot diameter / per foot of depth / per 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 are –
    a. Required
    b. Acceptable as long as they have extended shafts for easier operations
    c. Acceptable as long as the inter 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 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 Facilities

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