Collection Study Guide
Class IV  (Made available by: Kansas Rural Water Association)

151. The presence of hydrogen sulfide in a collection system is usually caused by the
   a. bacterial oxidation of sulfur in the presence of dissolved oxygen.
   b. bacterial reduction of methane in the absence of dissolved oxygen.
   c. bacterial reduction of methane in the presence of dissolved oxygen.
   d. bacterial reduction of sulfate compounds in the absence of dissolved oxygen.

152. Which of the following rules apply to the operation of gas or electric welding equipment?
   a. adequate fire protection must be provided.
   b. operators must be thoroughly trained.
   c. protection of other personnel must be provided and used.
   d. all of the above.

153. The overall efficiency of a pumping unit, if the current usage is 75 amperes at 220 volts and the pump output is 500 gpm at a head of 100 feet, is ________%.
   a. 43
   b. 57
   c. 59
   d. 76

154. Upon investigating a complaint of bad odors around a catch basin, you find that the trap and water level appear to be in good order. The proper next step is to
   a. add 7.5 to 10 pounds of quicklime to the basin daily until the odor diminishes.
   b. ask residents to stay away from the catch basin area.
   c. flush the basin with fresh water.
   d. rod and then ball the connection from the catch basin to the sewer.

155. Which of the following is not typical of a "submersible" pump?
   a. can be installed in a crooked hole.
   b. minimizes vandalism.
   c. quieter operation.
   d. requires water lubrication.

156. Possible types of atmospheric hazards found in manholes include
   a. explosion.
   b. oxygen deficiency.
   c. toxic gases.
   d. all of the above.

157. The flushing water pressure in a water-lubricated wastewater pump should be ________ than the pump discharge pressure.
   a. 10 psi less
   b. 5 psi less
   c. 5 psi more
   d. 10 psi more
158. Given the following data, what is the most likely cause of the mechanically cleaned bar screen problem?

DATA:  Above normal water differential across bar screen.  
       Drive motor shaft turning.  
       Drive sprocket, chain, rake not moving.  
       Less than normal flow on bar screen downstream side.  
       Bar screen mode selector in automatic position.  
       Normal seasonal flow (influent) coming into bar screen.  
       Alarm systems operating normally.

   a. low influent (incoming) level.  
   b. raw wastewater pumping units out of service.  
   c. sheared pin or disengaged clutch on drive unit.  
   d. none of the above.

159. The chlorinator is set to feed at the rate of 240 lbs/day, if the average flow through the plant is 2.0 MGD, approximately what is the daily average chlorine dosage in mg/L?

   a. 7 mg/L.  
   b. 12 mg/L.  
   c. 14 mg/L.  
   d. 28 mg/L.

160. Suppose the chlorine demand is 4 mg/L and a 0.1 mg/L chlorine residual is desired. How many pounds of chlorine will be required for a flow of 1.2 MGD in 24 hours?

   a. 20 lbs.  
   b. 39 lbs.  
   c. 41 lbs.  
   d. 62 lbs.

161. A pump has a capacity of 7,000 gpm and lifts wastewater 22 feet (total head). If the pump efficiency is 85 percent, what size horsepower motor is required?

   a. 40 hp.  
   b. 42.5 hp.  
   c. 50 hp.  
   d. 55 hp.

162. You are in charge of a lift station that delivers the following quantities of wastewater (in cubic feet): Sunday, 1,325,000; Monday, 750,000; Tuesday, none (shut down for repairs); Wednesday, 505,000; Thursday, 275,000; Friday, 320,000; Saturday, 280,000. What is the average daily flow in gallons per day for the week?

   a. 345,000  
   b. 494,000  
   c. 3,700,000  
   d. 4,300,000
163. A flow of 750 gal/minute is passing through a wet well that is 50 feet long by 20 feet wide by 12 feet deep. The average detention time is
   a. 30 minutes  
   b. 50 minutes  
   c. 120 minutes  
   d. 240 minutes

164. The wet well of a pump station is 8 feet long by 7 feet wide. When the influent flow was shut off, the drawdown rate with one pump running was 2 feet in 5 minutes. The pumping rate for that pump was about ______ gpm.
   a. 22.4  
   b. 30  
   c. 168  
   d. 335

165. Given the data below, what is the most likely cause of the problem?
   DATA: Wet well inlet is normal for dry weather flow. Wet well alternating excessively high and excessively low levels. Lead pump starts at right level, level continues to rise, pump stops at right level. Follow pump starts at right level, level drops, pump stops at right level. Lead pump check valve lifting arm remains stationary in lowered position when pump starts and stops. Follow pump check valve lifting arm rises when follow pump starts, goes to lowered position when it stops. Force main pressure remains same when lead pump starts, increases when follow pump starts, drops to previous level when follow pump stops. Low-level pressure switch normal. High-level pressure switch normal. Electrical controls automatic.
   a. lead pump clogged.  
   b. force main pressure too high.  
   c. follow pump clogged.  
   d. both pumps clogged.

166. Given the data below, what is the most likely cause of the problem?
   DATA: Wet well inlet has increased flow because of rain. Wet well drops normally from weather conditions, rises much more rapidly than normal. Lead pump cycles on and off at right levels faster than normal. Follow pump cycles on and off at right levels faster than normal. Follow pump motor shaft turns backwards when off with lead pump running. Follow pump check valve lifting arm stays in raised position. Force main pressure high with both pumps on, too low when lead pump is on alone. Air bubbler system normal. Electrical controls on automatic.
a. check valve in follow pump clogged.
b. follow pump check valve stuck closed.
c. follow pump electrical system wired backwards.
d. lead pump check valve clogged.

167. Given the data below, what is the most likely cause of the lift station problem?

DATA: Wet well inlet has normal dry weather flow.
Wet well is erratic with alternating excessively high and low levels.
Lead pump starts and stops erratically.
Follow pump starts and stops erratically.
Lead and follow pumps both have normal discharge.
Force main pressure erratic with alternating high and low pressures.
Lead air compressor running.
Low-level pressure switch is erratically opening and closing.
Malfunctioning high-level pressure switch is erratically opening and closing.
Electric controls are on automatic.

a. malfunctioning air bubbler system causing erratic wet well influent.
b. malfunctioning level control is causing pumps to run constantly.
c. malfunctioning level control is causing pumps to run out of phase.
d. malfunctioning level control causing lead-follow sequence switch to be broken.

168. Which of the following are accepted means for applying herbicides to control roots in wastewater collection systems?

a. aeration.
b. foaming.
c. stem injection.
d. all of the above.

169. Velocity may be sensed

a. electrically.
b. hydraulically.
c. mechanically.
d. all of the above.

170. Using water on a gas chlorine leak will

a. form sodium hypochlorite which can be salvaged for future use.
b. make the leak worse.
c. neutralize the chlorine.
d. stop the leak.

171. Your town has been receiving complaints about odors in your sewer system. To correct the problem, you have been instructed to use chlorine for odor control. The recommended dose is 15 mg/L and your flow is 85 gpm. How many pounds of chlorine a day will you use?

a. 6.7 lbs.
b. 9.9 lbs.
c. 12.6 lbs.
d. 15.3 lbs.
172. A 2-foot wide rectangular channel is carrying a discharge or flow rate of 15 cubic feet per second. If the depth of the flow is 18 inches, what is the average velocity?
   a. 0.2 ft/sec.
   b. 0.417 ft/sec.
   c. 2.4 ft/sec.
   d. 5.0 ft/sec.

173. What prevents any solution or water from backing up into the chlorine line?
   a. release valve.
   b. check valve.
   c. auxiliary valve.
   d. none of the above.

174. Important considerations when reviewing the plans for a lift station include:
   a. access.
   b. industrial development potential.
   c. trench soil conditions and availability of suitable shoring materials.
   d. all of the above.

175. Given the data below, what is the most likely cause of the problem?

   DATA: Wet well inlet, dry weather flow.
   Wet well drops normally, rises faster than normal between pumping cycles.
   Lead pump cycles on and off at right levels faster than normal.
   Lead pump motor shaft turns backwards between pumping cycles.
   Lead pump check valve lifting arm stays in raised position.
   Force main pressure bounces erratically between pumping cycles.
   Electrical controls on automatic.

   a. lead pump suction valve clogged.
   b. lead pump electrical system backwards.
   c. follow pump check valve clogged.
   d. check valve in lead pump clogged.

176. Which of the following are appropriate uses of closed-circuit television by wastewater collection system workers?
   a. chemical addition.
   b. evaluating effectiveness of sewer cleaning and clearing techniques.
   c. removing sources of infiltration.
   d. all of the above.

177. Emergency stoppages in pipelines may be cleared safely by use of
   a. bar screens.
   b. high velocity cleaners.
   c. TV cameras.
   d. all of the above.
178. You are going to lay a sewer that must carry a minimum flow of 1.0 MGD when flowing full and have a velocity (when full) of not less than 2.0 feet/second nor more than 3.0 feet/second. Which of the following diameters should be selected for the sewer?
   a. 6 inches.
   b. 8 inches.
   c. 10 inches.
   d. 12 inches.

179. Which of the following would be the safest action to take in the event of a major chlorine container leak?
   a. call the fire department to hose down the container.
   b. notify local police or sheriff.
   c. roll the container so that liquid rather than gas escapes.
   d. submerge the container in a basin or stream if feasible.

180. Ideally, the pH meter should be standardized
   a. before each use.
   b. weekly.
   c. monthly.
   d. once.

181. In the steps of the decision-making process, which step utilizes outside influences, such as experiences, the most?
   a. analyzing the problem.
   b. defining the problem.
   c. developing alternatives.
   d. selecting one alternative.

182. If you were in charge of a large operation with four foremen, three whose work was exceptionally good and a fourth whose work was substandard, what should you do?
   a. demote the substandard foreman and bring up a replacement from the ranks.
   b. discuss the problem with the substandard foreman and offer to help before any other action is taken.
   c. find a replacement and then fire the substandard foreman.
   d. wait to see if the substandard foreman does better.

183. Which of the following items is not to be considered in the budget for a utility?
   a. anticipated costs due to labor and maintenance.
   b. anticipated revenues.
   c. costs of street maintenance.
   d. insurance.

184. Which of the following are reasonable or valid objectives of a cost accounting program for a wastewater utility?
   a. identify methods or measures for controlling increases in operating costs.
   b. provide data for budget development and preparation.
   c. provide data that helps in making decisions about repairs versus replacement of equipment items.
   d. all of the above.
185. You have a centrifugal pump that delivers 400 gpm against a head of 200 feet with a combined pump and motor efficiency of 70%. What is the cost for electrical power for operating the pump 12 hours/day for three months of 31 days each? (The electrical cost is 5 cents per kilowatt hour and 1 horsepower = 0.746 kilowatt.)
   a. $281.
   b. $842.
   c. $1,200.
   d. $1,682.

186. Your town has been receiving complaints about odors in your sewer system. To correct the problem, you have been instructed to use chlorine for odor control. The recommended dose is 15 mg/L and your flow is 85 gpm. How much must you budget per year for chlorine if it costs $0.17 per lb.?
   a. $950.
   b. $1237.
   c. $1425.
   d. $1750.

187. There are two components involved with the managerial position. These are
   a. performing all the managerial functions and reporting to a higher authority.
   b. performing the managerial functions and possessing authority.
   c. performing the managerial functions is the only requirement.
   d. possessing authority is the only requirement.

188. Scientific decision-making tends to refer to
   a. using computer techniques on quantifiable information.
   b. problem-solving in a particular order.
   c. experimentation.
   d. consulting a scientist.

189. Which of the following is not part of a good public relations program?
   a. concise and easy to understand billing.
   b. encouraging visits to the plant.
   c. prompt response to consumer complaints.
   d. referring all complaints to the manager.

190. Getting the facts is the first step in what part of the process?
   a. development of alternatives.
   b. problem analysis.
   c. problem definition.
   d. selection of alternatives.

191. When an employee breaks the rules and requires discipline, who is responsible for administering it?
   a. fellow employees.
   b. personnel office.
   c. supervisor.
   d. upper management.
192. In order to budget a certain number of personnel, an operator should know the amount of "backlog" work, the rate at which it increases, and how to apply ________ to determine total estimated man-hours.
   a. job standards.
   b. pay scales.
   c. time.
   d. work orders.

193. You are notified that a semi-truck was involved in an accident 5 miles upstream from the treatment plant. Storm water inlets to the combined wastewater collection system are receiving a large quantity of an unknown chemical. What is the first action that would be taken?
   a. determine type of chemical from shipper.
   b. evacuate all homes in vicinity of sewer.
   c. immediately instruct treatment plant to start bypassing wastewater.
   d. warn downstream water treatment plant.

194. A mechanical ventilation system for the wet well portion of a lift station which operates continuously should be able to exchange the air in the wet well _______ times an hour.
   a. 6
   b. 20
   c. 30
   d. 60

195. Proper selection of an emergency lighting unit for a particular location requires careful consideration of
   a. costs.
   b. lighting requirements.
   c. types of batteries.
   d. all of the above.

196. In keeping records,
   a. every test result should be included in an annual report.
   b. poor records are better than no records.
   c. records should be destroyed every two years.
   d. records should be kept up-to-date and maintained as long as they are useful.

197. Collection system maintenance programs include ________ maintenance.
   a. emergency.
   b. operation.
   c. public.
   d. none of the above.

198. Recruiting of new utility employees falls within which category?
   a. directing.
   b. organizing.
   c. planning.
   d. staffing.
199. The managerial function which includes the guiding, teaching, motivating and supervising of treatment plant shift operators is
   a. staffing.
   b. planning.
   c. organizing.
   d. directing.

200. If a chemical costs $30 per ton, how much will it cost per year to treat a flow of 1.5 MGD if the average dose is 18 mg/L?
   a. $803.
   b. $1,110.
   c. $1,233.
   d. $1,506.
151. d 176. b
152. d 177. b
153. b 178. c
154. c 179. b
155. d 180. a
156. d 181. c
157. c 182. c
158. c 183. c
159. c 184. d
160. c 185. c
161. c 186. a
162. c 187. a
163. c 188. b
164. c 189. d
165. a 190. c
166. a 191. c
167. c 192. a
168. b 193. a
169. d 194. a
170. b 195. d
171. d 196. d
172. d 197. a
173. b 198. d
174. a 199. d
175. d 200. c