301. Turbidity in wastewater is caused by
   a. color.
   b. dissolved calcium.
   c. hardness.
   d. finely divided suspended material.

302. The gas most commonly associated with septic wastewater is
   a. carbon dioxide.
   b. carbon monoxide.
   c. hydrogen sulfide.
   d. methane.

303. How many cubic meters per second in 10 MGD?
   a. 0.44
   b. 1.44
   c. 4.73
   d. 24.62

304. An upright circular cylinder tank (flat bottom) has a diameter of 12 feet. When filled
to a depth of 8 feet, the volume is
   a. 226.2 cubic feet.
   b. 904.8 cubic feet.
   c. 3619 cubic feet.
   d. 5000 cubic feet.

305. Mechanical ventilation of a lift station is required to
   a. lower temperatures to reduce proportion of hydrogen sulfide.
   b. reduce chlorine demand.
   c. reduce corrosion.
   d. increase DO in raw wastewater.

306. A wet well probe is usually used for ________ determination(s) of level.
   a. approximate
   b. dual point
   c. continuous
   d. single point

307. A pump is delivering at less than the expected rate of discharge. Which of the
causes listed below is incorrect?
   a. speed of motor too low.
   b. pump not primed.
   c. impeller clogged.
   d. discharge head too low.
308. Metal pipes often fail because of
   a. back siphonage.
   b. browning movement.
   c. galvanic action.
   d. reverse osmosis.

309. A centrifugal pump is pumping 200 gpm against a 40-foot total pumping head. The output power of the pump is about _______ horsepower.
   a. 0.5
   b. 2
   c. 15
   d. 121

310. When a fire hydrant is operated, it should be
   a. just opened enough to have a flow.
   b. opened fully.
   c. opened halfway.
   d. regulated to flow required.

311. A 42-inch diameter pipe is flowing at a rate of 6.5 feet per second. What is the flow in cubic feet per second?
   a. 17.86
   b. 35.71
   c. 62.50
   d. 521.25

312. If the pump bearings on horizontal centrifugal pumps are over lubricated, the most important effect is that the extra lubricant
   a. will result in smoother and more efficient operation of the pump.
   b. will not make any difference in the operation of the pump.
   c. will be wasted.
   d. shaft or shaft sleeve will be damaged.

313. If packing is not maintained properly,
   a. cavitation damage will result.
   b. impeller will corrode.
   c. loss of suction due to air being allowed to enter pump.
   d. shaft or shaft sleeve will be damaged.

314. Air flow through a trickling filter when the influent is warmer than the air temperature is
   a. upward through the filter.
   b. downward through the filter.
   c. inadequate and may require forced air ventilation.
   d. improved by decreasing the recirculation.
315. An active sludge in the aeration tank with an abundant available food supply will have a relatively
   a. high oxygen uptake and fast settling rate.
   b. high oxygen uptake and slow settling rate.
   c. low oxygen uptake and fast settling rate.
   d. low oxygen uptake and slow settling rate.

316. The reaction of chlorine and ammonia produces a compound which is called
   a. ammonium chloride.
   b. chloral hydrate.
   c. chloramine.
   d. hydrazine.

317. A malfunctioning gas chlorination system has normal gas pressure, no feed rate indicated on rotometer, and no injector vacuum. What is the most likely cause of the problem?
   a. air leak upstream of rotameter.
   b. gas line plugged.
   c. injector clogged.
   d. pressure reducing valve diaphragm ruptured.

318. What is the impact of increased viscosity on the effectiveness of mixed media filters? Mixed media filters are
   a. affected only if temperature also changes.
   b. less effective.
   c. more effective.
   d. not affected.

319. The precipitate in coagulation with alum is aluminum
   a. bicarbonate.
   b. carbonate.
   c. hydroxide.
   d. sulfate.

320. 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
   d. none of the above.
321. The least amount of chemical used to remove turbidity is known as the
   a. coagulation range.
   b. combination dosage.
   c. efficiency range.
   d. optimum dosage.

322. The method of sludge handling resulting in a supernatant with the highest BOD is
   a. aerobic digestion.
   b. anaerobic digestion.
   c. centrifugation.
   d. vacuum filtration.

323. Sodium chloride is used in the low pressure wet oxidation unit's
   a. water softener.
   b. steam generator.
   c. deaerator.
   d. chemical feed tank.

324. The quantity of volatile solids in the content of the sludge is an indirect measure of
   the
   a. amount of the sample that will evaporate upon standing.
   b. "food" available for the bacteria in the digester.
   c. number of bacteria in the digester.
   d. primary effluent suspended solids.

325. Which solids can not be removed by vacuum filtration?
   a. dissolved solids.
   b. settleable solids.
   c. suspended solids.
   d. total solids.

326. Belt filter press are operated as a __________ process.
   a. batch
   b. continuous
   c. either one, depending on circumstances.

327. Given the following data, calculate the desired pounds of mixed liquor suspended solids (MLSS) in the aeration tank.

   DATA: Primary effluent suspended solids = 120 mg/L.
   Influent flow = 2.0 MGD.
   Desired sludge age = 5.0 days.
   Aeration tank = 100' x 45' x 15'.
   Influent BOD = 235 mg/L.
   Effluent suspended solids = 15 mg/L.

   a. 6000 lbs.
   b. 8000 lbs.
   c. 10,000 lbs.
   d. none of the above.
328. Calculate the sludge wasting rate necessary to maintain an MCRT of 7.5 days.

DATA: MLSS = 1800 lbs.
    RAS concentration = 7500 mg/L.
    Waste flow = 4000 gpd.
    Effluent suspended solids conc. = 18 mg/L.
    Influent flow = 0.7 MGD.

a. 3000 gpd.
b. 3400 gpd.
c. 3800 gpd.
d. 4200 gpd.

329. Calculate the sludge age.

DATA: Suspended solids concentrations are obtained by the centrifuge method.
    Aeration tank sludge units = 78,550.
    Final clarifier sludge units = 26,240.
    Excess sludge flow to waste = 0.100 MGD.
    Excess sludge concentration = 15%.
    Final effluent flow = 6.0 MGD.
    Final effluent suspended solids = 10.0 mg/L.
    Sludge weight to concentration ration = 800.
    Sludge aeration hours per day = 18 hrs/day.

a. 4 days.
b. 5 days.
c. 6 days.
d. 7 days.

330. A 240 gallon per minute mixed media filter filters at a rate of 2 gals./sq.ft./minute is
    backwashed at an average of 24 inch vertical rise for 3 minutes. How many
gallons of wash water was used?

a. 5,000.
b. 5,400.
c. 6,000.
d. 6,200.

331. Given the data below, what is the most likely cause of the activated sludge diffused
    aeration system problem?

DATA: Blower air rate output high.
    Organic load normal.
    Hydraulic load normal.
    Borderline low dissolved oxygen.
    Low turbulence throughout aeration tank.
a. aeration system piping leaking.
b. excessive air bubble shearing by diffusers.
c. return sludge rate too high.
d. underaeration because of low blower speed.

332. Given the data below, what is the most likely cause of the extended aeration facility problem?

DATA: Blower normal.
Flow normal for dry weather.
DO level normal.
Drop pipe air control valves half open.
Dead spot on surface around one drop pipe.
Dead spot remains when drop pipe air control valve fully open.

a. air header pipe clogged.
b. blower discharge pipe clogged.
c. blower intake filter clogged.
d. drop pipe clogged.

333. An incubator for the BOD test should be controlled at ______ C.
   a. 15
   b. 20
   c. 25
   d. 30

334. Results of the settleable solids test run using Imhoff cones may be used to
   a. calculate the Imhoff Settling Index (ISI).
   b. calculate the pounds of solids pumped to the digester.
   c. indicate the quality of the final effluent.
   d. none of the above.

335. Calculate the percent volatile solids.

DATA: 100 ml of sample
Crucible weight = 19.9850 g
Crucible plus dry solids = 20.0503 g
Crucible plus ash = 20.0068 g

a. 33%
b. 50%
c. 67%
d. 74%

336. In certain situations, a supervisor encourages the employees to make their own decisions. This is considered to be
   a. against the rules to follow past experiences in decision-making.
   b. bad form since the supervisor eventually loses control.
   c. highly desirable, since it encourages employee growth and frees the supervisor for other tasks.
   d. passing the buck.
337. Treatment basin (primary sedimentation, grit tank, aeration tank, final clarifier, etc.)
   drains
   a. must be higher than the receiving sump to allow for gravity flow out of the basin.
   b. must be lower than the receiving sump to allow for gravity flow out of the basin and into the sump.
   c. need not be valved closed if the drain is higher than the receiving sump.
   d. need not be maintained as it is always faster to pump a treatment basin dry than allow it to drain to the receiving sump.

338. Successful communication requires mutual
   a. agreement.
   b. confusion.
   c. transmission.
   d. understanding.

339. When a great deal of authority is delegated on many levels, an organization may be described as
   a. authoritarian.
   b. centralized.
   c. decentralized.
   d. unstructured.

340. Recognition and job security are indications of
   a. a good organization.
   b. a good supervisor.
   c. external morale factors.
   d. internal morale factors.

341. Generally, as an individual progresses upward in management, reliance on personal technical skill
   a. changes to the more complex.
   b. decreases.
   c. increases.
   d. remains the same.

342. If the sewer rate is $5.50 for the first 500 cubic feet and all consumption over the minimum is billed at the rate of 25 cents per 100 cubic feet, how much would a customer using 1,200 cubic feet be billed?
   a. $5.25
   b. $6.25
   c. $6.75
   d. $7.25

343. What equipment should be calibrated in a treatment plant?
   a. chemical feeders.
   b. continuous recording chlorine residual analyzer.
   c. continuous recording pressure gauges.
   d. all of the above.
344. Special parts that should be carried by the maintenance worker are usually listed in the
   a. machine blueprint.
   b. machine history record.
   c. machine manufacturer’s manual.
   d. work order.

345. To protect a wastewater facility against vandalism, you should not use
   a. combination padlocks on the gates.
   b. fencing around the entire facility.
   c. metal doors.
   d. windows that have plastic panes instead of glass.

346. How can the supervisor be certain that scheduled maintenance is completed?
   a. ask the workers.
   b. hire someone to inspect completed work.
   c. use a form that compares work assigned with work completed.
   d. wait and see if there are any failures.

347. Word has just come down from the top that operating funds are being cut. How should this be handled?
   a. cut the supplies and repairs in order to balance the budget.
   b. fire some of the less-productive old employees.
   c. keep it quiet and do what you have to do—“The less said the better.”
   d. let the other personnel know what the situation is and ask for their help.

348. One opening has become available which would be an advancement to any one of the three qualified eager employees. How should this situation be handled?
   a. hire an outsider to fill the position.
   b. pick one and notify all personnel of the change.
   c. split the work between the three and leave the position open.
   d. talk to the three as a group, explain the situation and make your selection, then notify all personnel of the change.

349. One of the employees in your crew complains about having to do a hard job. The proper thing to do is
   a. explain that all employees must do their fair share of the hard work as well as the easier tasks.
   b. ignore the complaint.
   c. promise that the next assignments will be easier ones.
   d. tell the employee to shut up and work or quit and go home.

350. Occasionally some of the people on a work crew will indulge in active horseplay. This should be
   a. discouraged because some of the workers might not like it.
   b. encourage because it promotes good fellowship.
   c. permitted as it is a form of relaxation.
   d. stopped immediately because it is likely to cause an accident.
Answers  
Wastewater Study Guide  
Class III

301. d  
302. c  
303. a  
304. b  
305. c  
306. d  
307. d  
308. c  
309. b  
310. b  
311. c  
312. d  
313. c  
314. a  
315. b  
316. c  
317. c  
318. b  
319. c  
320. c  
321. d  
322. c  
323. a  
324. b  
325. a  
326. b  
327. c  
328. c  
329. b  
330. b  
331. a  
332. d  
333. b  
334. b  
335. c  
336. c  
337. a  
338. d  
339. c  
340. a  
341. b  
342. d  
343. d  
344. c  
345. a  
346. c  
347. d  
348. d  
349. a  
350. d