

## Questions Module 4

### DRINKING WATER SUPPLY

Mark the correct alternative in yellow. Note that the correct answers can be 1 or up to all 4 alternatives.

1. To locate the raw water intake in the hypolimnion of a deep lake is normally regarded as on hygienic barrier. At what time of the year can this barrier be ineffective?
  - a. In the summer
  - b. In the fall and in the spring when the lake has a "turnover"
  - c. In the winter
  - d. In the fall and summer
  
2. What characterizes the water in a dystrophic lake?
  - a. High in humic acids
  - b. A yellow color of the water
  - c. Very turbid water
  - d. Contamination with bacteria
  
3. Which of the processes can be used to treat water from a dystrophic lake?
  - a. Coagulation
  - b. Ion exchange
  - c. Nanofiltration
  - d. Ozonation
  
4. Which of the processes do you think are suited to treat water from a eutrophic lake?
  - a. Adding lime to the water
  - b. Ozonation
  - c. Coagulation followed by flotation and filtration (dual media and carbon filtration)
  - d. Ion-exchange
  
5. What is an aquifer?
  - a. A type of groundwater
  - b. An underground body of sediments or rock holding a groundwater reservoir
  - c. Groundwater in bedrock
  - d. Groundwater recharged by a river
  
6. Groundwater normally has:
  - a. A more stable temperature than surface water

- b. Higher content of suspended solids (SS) than surface water
  - c. Better hygienic quality than surface water
  - d. Better protection against pollution than surface water
7. In Norway two hygienic barriers are needed when constructing a water supply system for more than 150 pe. Which of the following options can be considered as a natural hygienic barrier
- a. Filtration unsaturated through soil
  - b. A water intake in the epilimnion
  - c. Restricted activity in primary recharge zone (zone 1) near a groundwater well
  - d. A water intake below the metalimnion in a deep lake
8. In the primary intake zone (zone 1) of a groundwater well the water should have:
- a. No bacteria when entering the zone
  - b. A protective layer of clay
  - c. A minimum of 60 d of residence time from the outer limit to the production well
  - d. Minimum 2 years residence time from the outer limit to the production well
9. What do you mean by residual head at the tap stand?
- a. Total head available between distribution reservoir and tapstand minus the head loss in the pipe
  - b. The head loss at the tap stand
  - c. Total head available between distribution reservoir and tapstand plus the total head loss
  - d. None of the above
10. What is the optimum residual head desired at the tap stand? What will happen if the residual head is too low?
- a. 50 m / flow will be high
  - b. 50 m / flow will be minimal
  - c. 15 m / flow will be minimal
  - d. 15 m / cause erosion of the valve
11. The key hydraulic parameters used for the design of the water supply pipe line are?

- a. Velocity, viscosity of water, water temperature, discharge
  - b. Discharge, elasticity of water, temperature, velocity
  - c. Pipe diameter (internal), velocity, flow, head loss
  - d. Head loss, velocity, flow
12. Which hydraulic formula do you recommend for the design of a combined sanitary sewers
- a. Darcy- Weisbach
  - b. Mannings formula
  - c. Hazen-Williams formula
  - d. Stokes law
13. High density polyethylene (HDPE) pipes are normally used for rural water supply. However, in which of the following situations Galvanised Iron (GI) pipes are used.
- a. In road crossing
  - b. In stream crossing
  - c. At tap stands
  - d. All of the above
14. Normally the community tap stand is located such that the average travelling time from the house to the tap stand is
- a. Not more than 2 hours
  - b. Not more than 15 to 20 min
  - c. Less than 1 min
  - d. Maximum 10 min
15. What treatment unit you recommend for a rural water supply system with stream as a source of water supply (fairly good quality)
- e. Sedimentation tank, mechanical aeration, sedimentation with coagulation, filtration
  - f. Sedimentation with coagulation, rapid sand filtration, chlorination
  - g. Sedimentation, slow sand filtration, disinfection with chlorine
  - h. Reverse osmosis