

THE OPEN UNIVERSITY OF SRI LANKA  
Department of Civil Engineering  
Diploma in Technology - Level 4

070



CEX 4234- WATER SUPPLY AND SEWERAGE ENGINEERING  
CED 2206- PUBLIC HEALTH ENGINEERING

FINAL EXAMINATION - 2005/2006

Time Allowed: Three Hours

Index No.

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Date: 07<sup>th</sup> April, 2006

Time: 930 - 1230

This paper consists of two sections, PART A and PART B.

Part A will get 25% of the total, while part B will get 75% of the total marks.

Please detach PART A and submit with your answer script separately at the end of the examination

**PART A**

You are advised to allocate 45 minutes for Part A

Answer all questions in the space provided.

1. Intakes can be divided into two groups, groundwater intakes and surface water intakes. Give three examples for each type. (06 marks)

2. A town water supply is given at 180 liters per head per day. Suggest a possible break up for the above demand. (07marks)



3. In Sri Lanka, losses and wastages in water supply is estimated as 15-20% of total supply. What would be the reasons for the above losses? **(06 marks)**

4. There is a proposal of drinking water supply scheme for a tsunami affected city at the coastal belt. The preliminary study says that the hardness of the water is 800 mg/l as  $\text{CaCO}_3$ . Suggest the necessary treatments for this water to make it suitable for drinking purposes. Surface water from irrigational tank, with turbidity around 20 NTU **(06 marks)**

5. BOD after 5 days ( $\text{BOD}^{20}_5$ ) of a wastewater sample at discharging point is 450 mg/l. (i) Estimate the ultimate BOD ( $\text{BOD}_L$ ) of the sewage. Assume that the  $k=0.21/\text{d}$  for this waste.  $(\text{BOD}) = (\text{BOD}_L) (1 - e^{-kt})$  **(06 marks)**

(ii) What is the treatment you suggest for the above water before discharge into inland waters? Assume that the permissible level of BOD of water to discharge into inland surface water is 250mg/l. **(06 marks)**

6. Daily alum requirement for a water supply system is 12ppm (mg/l). The water supply system provides water for a city with 50000 populations. If the daily demand of the area is 210 lpcd how many Kilograms of alum will be required for a month (30 days)? **(07 marks)**



7. What are the advantageous and disadvantageous of the centrifugal pumps in water supply?  
(06 marks)

8. What are the disadvantageous of trickling filter process when compared with the activated sludge process?  
(06 marks)

9. What is meant by 'back siphonage' how do you prevent it?  
(06 marks)

10. A factory wastewater with the concentration of 44 mg/l with the 25 m<sup>3</sup>/day rate of flow discharges to this river. A river shows the pollutants concentration of 2 mg/l and flows with a rate of 100 m<sup>3</sup>/day. Assuming total mixing, determine the pollutant concentrations at the downstream of the river.  
(08 marks)



**11. Pick the best answer out of the given choices.**

*(03 marks per each)*

i). North Central province, many people suffer from mottling of teeth and deformation of bones. What ground water pollutant causes such diseases?

- a. Nitrogen
- b. Fluoride
- c. Bacteria
- d. Iron
- e. Manganese

ii). Corrosion in sewer is due to

- a. Methane
- b. CO
- c. CO<sub>2</sub>
- d. H<sub>2</sub>S
- e. All the above

iii). Priming of a centrifugal pump is necessary

- a. If it is located above the reservoir level
- b. If it is located below the reservoir level
- c. If it is located at the reservoir level
- d. If delivery head is high
- e. If discharge is high

iv). What device that allows water to flow only in one direction?

- a. check valve
- b. butterfly valve
- c. gate valve
- d. altitude valve
- e. air-release valves

v). In activated sludge process the solid retention time should range between

- a. 3 to 8 hours
- b. 1 to 2 days
- c. 2 to 5 days
- d. 5 to 15 days
- e. 15 to 50 days

**12. Mention if the following statements are true (T) or false (F) (03 marks per each)**

- |   | True  | False |
|---|-------|-------|
| i). The runoff is directly proportional to the effective rainfall.                        | ..... | ..... |
| ii). Fresh sewage is generally alkaline   | ..... | ..... |
| iii). To remove very fine particles from water, the method adapted is filtration          | ..... | ..... |
| ii). Treatment of water with alum increases acidity and hardness of water                 | ..... | ..... |
| v). Depth of water table is directly proportional to the rate of withdrawal of the water. | ..... | ..... |

