



UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

DEGREE IN ENVIRONMENTAL HEALTH
FINAL EXAMINATION PAPER 2005

TITLE OF PAPER : **INDUSTRIAL WASTE MANAGEMENT**

COURSE CODE : **EHS 522**

DURATION : **3 HOURS**

MARKS : **100**

INSTRUCTIONS :

- : **READ THE QUESTIONS & INSTRUCTIONS CAREFULLY**
- : **ANSWER ANY FIVE QUESTIONS**
- : **EACH QUESTION CARRIES 20 MARKS.**
- : **WRITE NEATLY & CLEARLY**

- : **NO PAPER SHOULD BE BROUGHT INTO OR OUT OF THE EXAMINATION ROOM.**

- : **BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.**

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR.

Question one

- a. Primary treatment for wastewater uses physical forces hence it is said that it uses physical methods. Explain four of these physical methods. (5)
- b. In the design of coarse screen for industrial wastewater treatment plant why should the velocity of the approach channel be kept between 0.5 and 0.8m/s? (2)
- c. In the design of coarse screen for industrial wastewater treatment plant why should the cross-sectional area of the approach channel be equal to the cross-sectional passing area of the screen? (4)
- d. Why should the velocity of the flow between the bars of the screen be not more than 1.2m/s? (4)
- e. In grit chamber a particle settling travel a distance of 100cm with a velocity of 10cm/s. What should be the retention time of the flow to allow the settling of all particles of the same size and bigger in the grit chamber before the flow passes over? (5)

Question two

Given that the hydraulic retention time for a sedimentation tank for industrial wastewater treatment is 2hrs.

- a. What is the volume of the flow in a day when the inflow is 50 litres per second (50L/s)? (7)
- b. What is the surface area of a sedimentation tank when the diameter of the tank is 30m? (6)
- c. Given that the tank above (b.) is to be used to treat the flow above (a.) and that depth of the tank is 4m. How many tanks do we need? (7)

QUESTION THREE

- a. Describe the biological phosphorus removal during wastewater treatment. (5 marks)
- b. Describe the process of nitrification and denitrification in the extended aeration in an oxidation ditch. (5 marks)
- c. What are advantages of using extended aeration? (5 marks)
- d. What are the three advantages and two disadvantages of denitrification in the operation of extended aeration for nutrients removal? (5 marks)

QUESTION FOUR

- a. Describe the process of rotating biological contactor in the wastewater treatment. Use sketches to elaborate your answer. (12 marks)

- b. What are the five benefits of using algal process in wastewater treatment?
(5 marks)
- c. What are three main limitations of algal use in wastewater treatment?
(3 marks)

QUESTION FIVE

- a. Describe the layout of the stabilization ponds and explaining the scientific reasoning for such layout.
(5 marks)
- b. If the quality of the effluent in the maturation pond is poor, what advantage recirculation of the effluent will provide and how?
(5 marks)
- c. What are the five factors that determine the coliform reduction in the maturation ponds?
(10 marks)

QUESTION SIX

- a. With an aid of sketch, describe the process of dissolved air flotation (DAF) in the sludge thickening process or oil and grease removal from wastewater.
(10 marks)
- b. Explain how activated carbon adsorption is used to purify effluent for stringent wastewater quality requirement.
(10 marks)