



UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

DEGREE IN ENVIRONMENTAL HEALTH

FINAL EXAMINATION PAPER 2007/2008

TITLE OF PAPER	:	INDUSTRIAL WASTE MANAGEMENT II
COURSE CODE	:	EHS 554
DURATION	:	2 HOURS
MARKS	:	100
INSTRUCTIONS	:	READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
	:	ANSWER ANY FOUR QUESTIONS
	:	EACH QUESTION CARRIES 25 MARKS
	:	WRITE NEATLY & CLEARLY
	:	NO PAPER SHOULD BE BROUGHT INTO NOR 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

You are an environmental health officer employed by the Government of Swaziland. You are asked to design a trickling filter system to treat wastewater. Describe how you will go about your design under the following headings:

- a. Determining the inflow of wastewater to be used in the design. (5 marks)
- b. Ascertaining the size of the treatment facility. (10 marks)
- c. Determine the operation and precaution (10 marks)

Question two

- a) Describe the process of rotating biological contactor in the wastewater treatment. Use sketches to elaborate your answer. (15 marks)
- b) What are the five benefits of using algal process in wastewater treatment? (5 marks)
(5 marks)
- c) What are limitations of algal use in wastewater treatment?

Question three

The design of a trickling filter is based on the following parameters:

1. Volumetric Loading rate = 0.2
2. BOD loading rate = 30 mgBOD/l /s

- a) Calculate the surface area of the trickling filter tank when the depth is 3m (5 marks)
- b) How many trickling filter tanks do we need for the plant? (5 marks)
- c) Explain how activated carbon adsorption is used to purify effluent for stringent wastewater quality requirement. (15 marks)

Question four

- a. Describe the layout of the stabilization ponds and explaining the scientific reasoning for such layout. (10 marks)
- b. If the quality of the effluent in the maturation pond is poor, what advantage recycling 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 five

Given that the wastewater generated from the city of Manzini is 20000m^3 and a BOD of 250 mg per m^3 per day. MLSS OF 450 mg / m^3 flowing into a tank volume of 18000m^3 with a BOD removal rate of 60%.

- i. Calculate Food / micro-organism rate (5 marks)
- ii. Why should we maintain a certain level of F/M in an activated sludge process? (6 marks)
- iii. What is the SPR_{spec} of the treatment process? (6 marks)
- iv. What is the sludge average age? (8 marks)