



UNIVERSITY OF SWAZILAND

Faculty of Health Science

Department of Environmental Health
Sciences

Final Examination 2009

Title of paper: INDUSTRIAL WASTE MANAGEMENT 11

Course code: EHS 554

Time allowed: 2 hours

Marks allocation: 100 Marks

Instructions:

- 1) Read the questions and instructions carefully
- 2) Answer ALL questions
- 3) Each question is weighted 25 marks
- 4) Write neatly and clearly

This paper is not to be opened until the invigilator has granted
permission

EHS 554 Final Examination 2009
Industrial waste management

Question one

- a) Explain the reason behind each specification of the following ponds for wastewater treatment:
1. Anaerobic,
 2. Facultative
 3. Maturation (15 marks)
- b) What are the five factors that are controlled for the proper operation of high rate algae ponds? (10 marks)

Question two

- a) Why nutrients should be removed from wastewater before discharge to environment. Explain five reasons (10 marks)
- b) With an aid of a diagram, describe the process of nitrification and denitrification in the extended aeration. (15 marks)

Question three

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

- a. Determining the inflow of wastewater. (5 marks)
- b. Ascertain the size of the treatment facility. (10 marks)
- c. Determine the cause of odour. (10 marks)

Question four

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 ratio (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)