



UNIVERSITY OF SWAZILAND
Faculty of Health Science

Department of Environmental Health
Sciences

Main Examination 2011

Title of paper: INDUSTRIAL WASTE WATER

Course code: EHS 554

Time allowed: 2 HOURS

Marks allocation: 100 Marks

Instructions:

- 1) Answer **Four** questions
- 2) Each question is weighted 25 marks
- 3) Write neatly and clearly
- 4) Begin each question in a separate sheet of paper

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

Question one



- (a) Mention the treatment system in the picture above. [1 marks]
- (b) Describe how the system illustrated above treats wastewater. [15 marks]
- (c) Would you recommend this system for the treatment of heavily polluted industrial water? Give **two reasons** for your response to the question. [4 marks]
- (d) How can you improve the above system if it is poorly performing? [5 marks]

Question two



- (a) In the conventional wastewater Treatment plant system where does the above form of **treatment occur** and for **what purpose**? [2 marks]
- (b) Describe five precautions that ought to be observed in the operation of the treatment process shown above [10 marks]
- (c) In an activated sludge treatment process, what is the ratio of F:M when the inflow is $1\text{m}^3/\text{s}$, load rate of $200\text{mgBOD}/\text{m}^3/\text{m}^2\cdot\text{day}$ and $\text{MLSS}=4\text{kg}$ with a volume of 14000m^3 [10 marks]
- (d) Mention five advantages of free oxygen over bonded oxygen in wastewater treatment by activated sludge process. [3 marks]

Question three

- (a) With an aid of a diagram explain the removal of nutrients from industrial wastewater in the extended aeration process of treatment. [20 marks]
- (b) Explain the advantage and disadvantage of the presence of nutrients in wastewater to be discharged to the environment. [5 marks]

Question four

- a. In the conventional method of industrial wastewater treatment, for heavily polluted water we normally use a combination of methods.
- i. Mention five of these methods. [5 marks]
 - ii. Show using a sketch, how these methods of treatment are linked in real situation, [5 marks]
 - iii. Using your knowledge of treatment efficacies explain your answer in (ii) above [5 marks]
- b. You are employed by the Matspa Town Board and you are assigned to investigate the source of pollution in the Great Usuthu. In your preliminary investigation you find that there are two companies in the area that use the material you found in the river and that the acts of polluting occur at night. What further investigation will you conduct to identify the company that is polluting? [10 marks]