UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

DEGREE IN ENVIRONMENTAL HEALTH

FINAL EXAMINATION PAPER 2007/2008

TITLE OF PAPER	:	INDUSTRIAL WASTE MANAGEMENT I
COURSE CODE	:	EHS 553
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.

190

QUESTION ONE

i. Mention five industrial wastewater pollutants that warrant wastewater treatment before discharge of industrial effluent to the environment? (10 marks)

ii. What are the consequences of discharging to the environment untreated industrial wastewater containing the pollutants you mentioned above? (13 marks)

iii. What unit is commonly used to express the quantity of inflow of wastewater per unit area? (2 marks)

QUESTION TWO

1. Mention five factors that determine the pollutants load of industrial wastewater.

2. Describe an experiment you will conduct to determine;
   a. total solids, (3 marks)
   b. filterable solids (3 marks)
   c. non filterable solids and (3 marks)
   d. Settleable solids. (3 marks)
   e. Describes the BOD test procedure (8 marks)

3. Mention five methods of industrial wastewater treatment classified as physical methods. (5 marks)

QUESTION THREE

1. What could be the consequences of installing a poorly designed screen in a wastewater treatment plant? (10 marks)

2. Mention four reason for removing grit before the wastewater influent enter the primary treatment. (4 marks)

c)   A screen was designed with the following parameters:
   1. Flow rate 2.0 m^3/s
   2. Design horizontal flow velocity (v_h) = 0.08 m/s in the approach channel.
   3. Depth of the channel 1.0 m
   4. Bar thickness = 10mm
   5. Assume Fc = 0 Fa = 0.5 sin = 30°

What is the:
   i. Cross sectional area of the channel (4 marks)
   ii. Width of the channel? (3 marks)
   iii. Number of bars of the screen (4 marks)

QUESTION FOUR

i. The BOD_5 of industrial wastewater has been measured as 600mg per litre under constant temperature of 20^oc. If the rate of BOD reduction was 0.23 per day what is the BOD_u? (5 Marks)

ii. What proportion (per cent) of BOD_u would remain unoxidized after 20 days? (10 marks)

iii. If the same BOD_u was to be subjected in a temperature of 35^oc for 10 days what will be the BOD remaining? (10 marks)

QUESTION FIVE

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

a. What is the volume of the tank when the inflow is 50 litres per second (50L/s)? (5 marks)

b. What is the surface area of the sedimentation tank in (a) above? (assume the diameter of the tank)? (10 marks)

c. Given that the tank above (b.) is to be used to treat the flow above (a.), how many tanks do we need? (Assume the depth). (10 marks)

192

ORDERED TESTS: CHEM 25, FULL BLOOD COUNT

- HAEMATOLOGY -

TEST	RESULT	FLAG	REFERENCE	UNIT
FULL BLOOD COUNT:				
RED CELL COUNT	3.47	L	3.8 - 5.7	10^12/ul
HAEMOGLOBIN	9.1	L	12.4 - 16.7	g/dL
HAEMATOCRIT	27.6	L	40 - 56	%
MCV	79.4		79 - 100	pg/mL
MCH	26.2	L	27 - 34	pg
MCHC	33.0		32 - 36	g/dL
PLATELETS	73	L	150 - 450	10^9/L
RDW	17.5	H	11 - 16	%
WHITE CELL COUNT	9.2		4 - 12	10^9/L
NE#	3.60 (39.20%)		2 - 7.5 (40 - 75%)	10^9/L
LY#	**5.40 (58.90%)**	H	1.5 - 4 (20 - 45%)	10^9/L
MO#	0.20 (1.80%)		0.1 - 1 (2 - 10%)	10^9/L
EO#	**0.00 (0.10%)**	L	0.04 - 0.4 (1 - 6%)	10^9/L
BA#	0.00 (0.00%)		0 - 0.1 (0 - 1%)	10^9/L

193