UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES
DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE
FINAL EXAMINATION [MAY 2012]

TITLE OF PAPER	:	ENVIRONMENTAL ASSESSMENT
COURSE CODE	:	EHS 551
ACADEMIC YEAR	:	2011/2012
TIME	:	2 HOURS
MARKS	:	75

INSTRUCTIONS

1. DO NOT OPEN THIS EXAMINATION PAPER UNTIL YOU ARE INSTRUCTED TO DO SO BY THE INVIGILATOR.
2. CHOOSE AND ANSWER THREE QUESTIONS ONLY, OUT OF THE FOUR QUESTIONS PRESENTED IN THIS PAPER.
3. NO FORM OF PAPER SHOULD BE BROUGHT INTO THE EXAMINATION ROOM.
4. BEGIN YOUR ANSWERS TO EACH QUESTION ON A FRESH PAGE OF THE ANSWER BOOKLET. ENSURE THAT ALL PAGES OF THE ANSWER BOOKLET ARE NUMBERED ACCORDINGLY.
5. WRITE CLEARLY; MARKS WILL NOT BE AWARDED WHERE HANDWRITING IS NOT POSSIBLE TO READ.
6. USE PROPER ENGLISH LANGUAGE GRAMMAR; POOR ENGLISH GRAMMAR SHALL RESULT IN LOSS OF MARKS.

QUESTION ONE

a) Discuss two documented examples to illustrate the fact that pollutants move across states and national boundaries. [4]

b) In pollutant fate, what is biotransport? [2]

c) Due to lack of suitable land to build houses, the Woodlands Village was established in a reclaimed landfill, in 1993. In 2011, some occupants started noticing cracks on their walls. In the absence of other obvious factors, such as earthquakes, the former landfill is suspected to be the cause of the damage on houses. Explain how this damage occurred. [4]

d) State four examples of organic pollutants. [4]

e) You are an environmental manager at a waste to energy (WTE) plant. The plant is equipped with all the latest pollution control devices; however, it is facing imminent closure as a result of challenges related to seasons of the year and a small population. Describe how these two problems are going to ultimately result in the closure of the plant. [6]

f) In microbial degradation;

1. What is mineralisation? [2]
2. State any two products of aerobic microbial degradation. [2]

g) Crude oil spilt in a lake is degraded in 1 week, whereas in the ocean, the same amount of oil disappears in half the time. State the most important factor that is responsible for this deference in the rate of degradation. [1]

TOTAL NUMBER OF MARKS IN QUESTION ONE [25]

QUESTION TWO

a) In microbial degradation, what type of degradation is likely to occur in a newly constructed hydropower dam? [2]

b) State one possible end product of the above degradation process. [2]

c) A house is built on a reclaimed landfill site. Natural gas, piped into the house from a distant natural gas plant, is used for cooking and heating purposes. Discuss two possible means by which the reclaimed landfill could result in gas smells coming from the basement of this house. [4]

d) List any four environmental factors that affect the composting process. [4]

e) The Swaziland Electricity Company will, from 2013, cut the supply of electricity to the high-tech Mpolonjeni Landfill, which is located 350 miles (≈ 564km) west of Swaziland. Clearly the 50 workers based at the landfill cannot travel to

Mbabane to buy fuel wood, cooking gas, etc, for their heating and cooking purposes. As an environmental manager based at the head office, what solution can you propose to the management to solve the problem? [4]

f) Coastal areas, for instance wetlands and mangrove swamps, bear the brunt of the continued inputs of wastes into the ocean. True or false? [1]

g) Discuss any two reasons for your choice in question (e) above. [4]

h) In command and control, one of the notorious challenges that industries often have to contend with is the "one size fits all" challenge. In not more than three points, describe this challenge. [3]

i) In chemical interactions, how can you mathematically illustrate a synergistic effect? [1]

TOTAL NUMBER OF MARKS IN QUESTION TWO [25]

QUESTION THREE

a) Within the Matsapha industrial site, there are a number of industries located within a walking distance from one another. Some of the activities found here include; road construction industries that import expensive material from South Africa; the burning of coal for industrial purposes, which releases steam, sulphur dioxide, ash and clinker; manufacture of wallboard using ovens that require high temperature heat for drying purposes; there is a refinery that burns off the natural gas found in petroleum, during refining processes. Not far from this industrial area there is village where most of the employees live. Answer the following questions;

   1. There is no landfill in this industrial area; what mechanism are the industries using to deal with their wastes? [2]
   2. Why is there no thermal pollution from coal burning? [2]
   3. How do the industries deal with clinker and ash from coal burning? [2]
   4. How do the industries deal with sulphur dioxide from coal burning? [2]
   5. How do industries deal with pollution from the burning of excess gas during petroleum refining? [2]

b) Discuss any two challenges of composting. [4]

c) Study the diagrams presented in Figure 1 and Figure 2 carefully. In, each case;

   1. State the name of the technology. [4]
   2. In not more than three points, describe how the technology operates. [6]

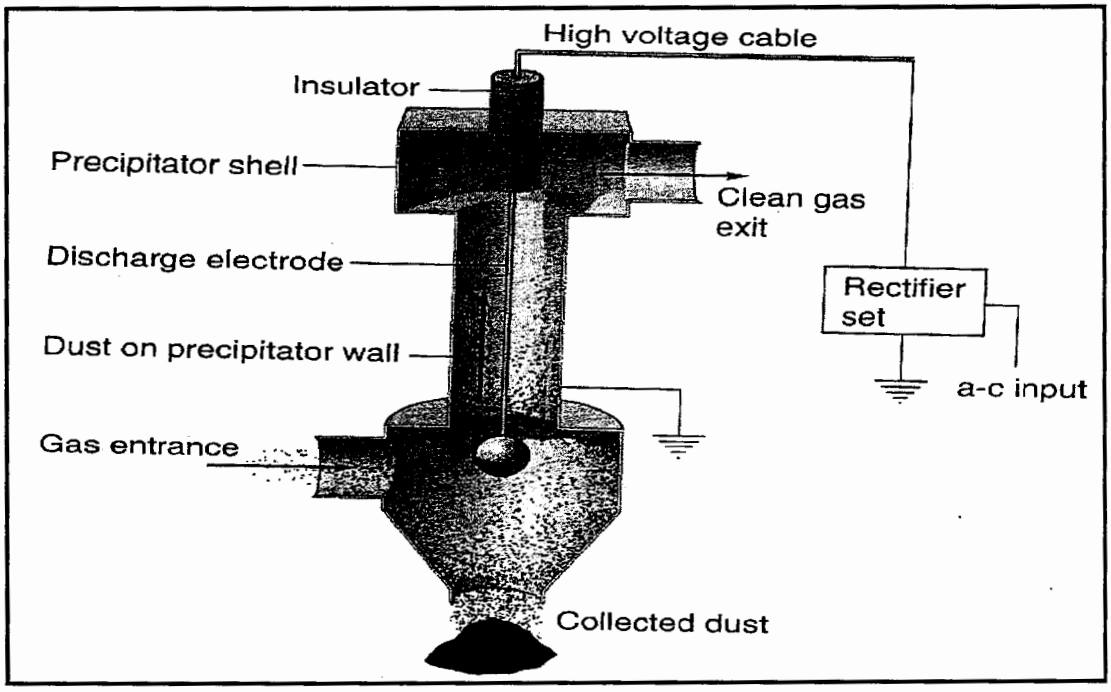

Figure 1: One of the end of pipe control technologies

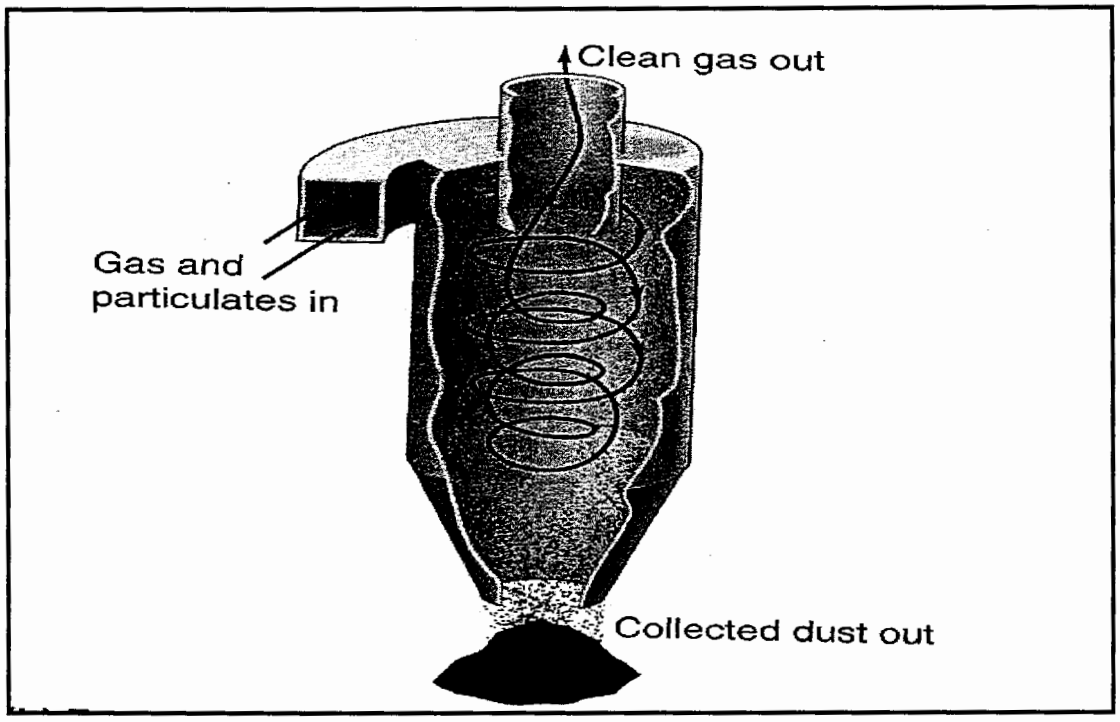

Figure 2: One of the end of pipe control technologies.

d) Input approach to waste refers to strategies aimed at reducing the amount of materials leaving the production–consumption system. True or false? [1]

TOTAL NUMBER OF MARKS IN QUESTION THREE [25]

QUESTION FOUR

a) It is a very well-known fact that CO causes thousands of deaths every year, particularly in poorly ventilated households. However, in households that use mosquito repelling chemicals, the impacts of CO are less significant. What chemical interaction is this? [2]

b) Output, input and throughput are some of the strategies that are used to deal with waste. For each of these strategies, state one example. [3]

c) Distinguish between closed loop and open loop recycling. [4]

d) Using catalytic converters as an example, describe how end of pipe strategies can result in short-term gains that may be offset by other forces. [4]

e) Scenarios given below are related to strategies aimed at dealing with various types of wastes. Study them carefully and state the strategy/technology that is closely related to the scenario.

1. Usually, the costs of installing and operating pollution control devices are often passed on to consumers in form of expensive finished products. [2]
2. A chemical undetected and unregulated in one year, could be regulated and detected the following year. [2]
3. Pollutant-laden air is passed through a fine mist of water and lime, which traps over 99% of the particulates and 80-95% of sulfur oxide gases. [2]
4. Pollutant-accumulating plants are used to remove metals or organics from soil by concentrating them in the harvestable parts. [2]

f) You are en environmental monitoring officer based in Arctic. Recently you noticed that symptoms of DDT poisoning are much higher towards the end of the winter season than all other times of the year. What possible explanation can you give for this observation? [4]

TOTAL NUMBER OF MARKS IN QUESTION FOUR [25]