

UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES
DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE
FINAL EXAMINATION [MAY 2013]

TITLE OF PAPER	:	ENVIRONMENTAL ASSESSMENT
COURSE CODE	:	EHS 551
ACADEMIC YEAR	:	2012/2013
TIME	:	2 HOURS
MARKS	:	75

INSTRUCTIONS

1. DO NOT OPEN THIS EXAMINATION PAPER UNTIL YOU ARE INSTRUCTED TO DO SO BY THE INVIGILATOR.
2. QUESTION ONE IS COMPULSORY. CHOOSE ANY OTHER TWO QUESTIONS IN ADDITION TO QUESTION ONE [THREE QUESTIONS IN TOTAL].
3. NO MARKS SHALL BE AWARDED FOR POOR HANDWRITING AND POOR ENGLISH LANGUAGE GRAMMAR.
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. NECESSARY PENALTIES SHALL BE APPLIED FOR ANY UNACCEPTABLE BEHAVIOUR DURING THE COURSE OF THIS EXAMINATION.

QUESTION ONE [TOTAL NUMBER OF MARKS = 25]

1. According to the ecofeminist environmental worldview, the main cause of our environmental problems is not just human-centredness, but specifically;
 - a. Female centredness
 - b. Male centredness
 - c. Male and female-centredness
 - d. Female centredness coupled with human rights
2. In environmental worldviews, endrocentrism refers to a society that is predominantly;
 - a. Female centred
 - b. Male centred
 - c. Male and female centred
 - d. Female centredness coupled with human rights
3. The collection of plastics by communities and the return of these to the manufacturing sector for the manufacture of plastic mats is a good example of;
 - a. Open-loop recycling
 - b. Closed-loop recycling
 - c. Primary recycling
 - d. Tertiary recycling
4. The manufacture of lower quality products is usually associated with;
 - a. Primary recycling
 - b. Secondary recycling
 - c. Tertiary recycling
 - d. None of the above
5. An air pollution device that is known to remove over 99% of the particulates and 80-95% of sulfur oxide gases is
 - a. The scrubber
 - b. The cyclone
 - c. Catalytic converters
 - d. Fluidized Bed Combustion (FBC)
6. The main principle of operation of the device you have chosen in question five above is as follows;
 - a. Pollutant-laden air is passed through bag filters
 - b. Pollutant-laden air is passed through an electric field
 - c. Pollutant-laden air is passed through a fine mist of water and lime
 - d. Pollutant-laden air is passed through a fluidized bed

7. The device you have chosen in question five above is often used in;
 - a. Stationary sources
 - b. Both stationary and mobile sources
 - c. Mobile sources
 - d. Coal burning sources only
8. The most problematic pollutant in pollution control devices used to control pollution in mobile pollution sources is;
 - a. CO
 - b. HNO₃
 - c. CO₂
 - d. SO₂
9. The two types of pollutants that almost all control devices fail to remove from stationary combustion sources are;
 - a. NO_x and CO₂
 - b. CO₂ and CO
 - c. PANs and CO
 - d. N₂O and CO₂
10. The main environmental problems associated with the gases that you have chosen in question nine above are;
 - a. Stratospheric ozone depletion and acid deposition
 - b. Acid deposition and the greenhouse effect
 - c. The greenhouse effect and ozone depletion
 - d. Acid deposition and global climate change
11. The use of electric current in removing particulates is associated with;
 - a. Fluidized bed combustion systems
 - b. Magnetohydrodynamics
 - c. Precipitators
 - d. Cyclones
12. Hot air, fed from underneath, suspends the mixture while it burns, thus increasing the efficiency of combustion. This is the description of the operational principle of;
 - a. Magnetohydrodynamics (MHD)
 - b. Fluidized Bed Combustion (FBC)
 - c. Scrubbers
 - d. Cyclones

13. The allocation of E5 million emalangeni for the compensation of former asbestos miners of Bulembu, is a good example of;
 - a. The polluter pay principle
 - b. The taxpayer pay principle
 - c. The consumer pay principle
 - d. The precautionary principle
14. According to the social ecology worldview, the ecological crisis we currently face results from;
 - a. Industrialized societies
 - b. Non-industrialized societies
 - c. Both industrialized and non-industrialized countries
 - d. Non-industrialized countries that are especially dependent on agriculture for their economic development.
15. The use of pollution control devices is tremendously desirable in reducing the impacts of air pollution from either stationary or mobile sources. However, some of these devices can result to the worsening of other environmental problems. A pollution control device that is more relevant to this statement is;
 - a. The wet scrubber
 - b. The catalytic converter
 - c. The bag filter
 - d. The cyclone
16. In environmental worldviews, if you consider a 100-year old oak tree useful only because it can provide quality mature wood from which good quality furniture can be produced, you consider this tree as having;
 - a. Intrinsic value
 - b. Utilitarian value
 - c. About 80% intrinsic value and 20% utilitarian value
 - d. Utilitarian and intrinsic value in equal proportions
17. Microbial breakdown of wastes in extremely hypoxic conditions result in production of;
 - a. CO
 - b. CO₂
 - c. CH₃
 - d. CH₄

18. One of the main factors contributing to the accumulation of POPs in remote areas in the Arctic is;
 - a. Humidity
 - b. Acidity
 - c. Temperature
 - d. Light
19. According to the theory of the transport fate of pollutants, you would expect to find dioxins;
 - a. Highly concentrated in areas that are far from the source (due to air transport)
 - b. Moderately concentrated at the source of pollution
 - c. Highly concentrated around the source of pollution
 - d. Evenly distributed everywhere
20. Living organisms exposed to DDT are likely to show signs of poisoning;
 - a. Any time after a year
 - b. Towards the end of winter
 - c. Towards the end of summer
 - d. Any time of the year
21. One of the products of microbial degradation in aerobic conditions is;
 - a. HNO_3
 - b. H_2O
 - c. H_2SO_4
 - d. H_2O_2
22. The most important principle of operation of this technique is that microorganisms (mainly bacteria) can be used to destroy hazardous contaminants or transform them to less harmful forms. This technique is;
 - a. Direct containment
 - b. Bioremediation
 - c. Dig and dump
 - d. Biosparging
23. A technique that encourage the in-situ biodegradation of petroleum-oil-lubricants (POLs) by providing oxygen to microorganisms in the soil is;
 - a. Bioventing
 - b. Dig and dump
 - c. Direct containment
 - d. Indirect containment

24. A good example of root exudates is;

- a. Root hairs
- b. Primary roots
- c. Secondary roots
- d. Sugars

25. Potentiation can be mathematically expressed as;

- a. $8-2 = 6$
- b. $3+3 = 6$
- c. $5+1 = 6$
- d. $0+2 = 6$

QUESTION TWO [TOTAL NUMBER OF MARKS = 25]

1. Living organisms are seldom exposed to a single pollutant. Instead, they are exposed to combinations of pollutants simultaneously. In the given scenarios below, state the relevant type of chemical interaction [10].
 - a. In 2004, Siphso was diagnosed with 20% lung cancer as a result of tobacco smoking. In 2011, his condition had deteriorated to 60%. Doctors advised him that this was due to the fact that he had started working in a coal mine in 2010.
 - b. In Mbabane, recent plant analysis has concluded that the observed deaths of plants are due to exposure to SO₂ and O₃, from power plants and photochemical smog.
 - c. Two groups of mice, [A] and [B], were kept in a laboratory for over 2 years. Both groups were fed with small amounts of DDT for about three months (scientists wanted to study the impacts of DDT). Somehow, the cage where group [A] was kept was damaged, and so, during the night group [A] would sneak out and help themselves to a huge sack of sugar that was kept in the laboratory. This occurred at the same period when both groups were undergoing DDT experiments. At the end of the experiment, group [A] showed 80% toxicity, while group [B] showed 35%.
 - d. Rural households in Nhlambeni use inefficient coal-burning stoves for heating and cooking in their houses, resulting in emission of huge quantities of CO. Households of Dlangeni also use a similar method for cooking. However, for heating, Dlangeni households use natural gas heaters, resulting in huge quantities of CO and CH₄. In recent health surveys, the highest incidence rates of respiratory problems were in Nhlambeni.
 - e. An office worker smokes 50 cigarettes a day. A taxi driver operating in the Mbabane-Manzini route also smokes 50 cigarettes a day. As far as lung damage is concerned, the taxi driver's lungs show 30% damage while the office worker shows 15% damage.
2. Dioxins are so toxic that in pollutant terminology, they are considered to be very close to nuclear catastrophes.
 - a. What are dioxins? [3]
 - b. How does human exposure to dioxins occur? [3]
3. In transport fate of pollutants, what is global distillation? [5]
4. Most people believe that cheaper products are a huge advantage to business operators and the general public. From an ecological point of view, however, this is unsustainable. Discuss any two disadvantages of cheaper products [4].

QUESTION THREE [TOTAL NUMBER OF MARKS = 25]

1. You are an environmental manager, working at the Arctic Environmental Station in Northern Scotland, monitoring the impacts of various pollutants.
 - a. In Northern Scotland there are no farming activities, however, you are observing increasing levels of farming chemicals like DDT. From where do these chemicals originate? [2].
 - b. Briefly describe how these chemicals reach the Arctic [5].
 - c. Your analysis reveals that DDT poisons mink whales, bears, foxes, lion seals. However, more toxicity is observed amongst bears and foxes towards the end of the winter season and not in summer. What explanation can you give for this observation? [5]
2. With regard to pollutant fate and transport, what do you understand by biotransport? [3]
3. State any three examples of organic wastes [3].
4. With regard to microbial metabolism, how does microbial breakdown of wastes in abundant oxygen conditions differ from microbial breakdown of wastes in conditions deficient of oxygen? [3]
5. What is swamp gas? [2]
6. State two examples of an area where you would expect to find production of higher quantities of swamp gas [2]

QUESTION FOUR [TOTAL NUMBER OF MARKS = 25]

1. What is phytoremediation? [3]
2. Distinguish between utilitarian value and inherent value [4].
3. In phytoremediation, what is rhizofiltration? [2]
4. State any three environmental factors that affect the composting process [3].
5. The chemical fate of pollutants is often influenced by a number of factors. Some factors inhibit pollutant breakdown, while others enhance the same.
 - a. How does temperature affect dissolved oxygen [DO]? [2]
 - b. How does temperature affect the rate of chemical reactions? [2]
 - c. How do organic wastes affect dissolved oxygen and aquatic organisms? [4]
 - d. What test can you use to determine the amount of dissolved oxygen in a water body or to determine quantities of organic wastes entering water bodies? [2]
 - e. Define the test you have stated in question 5 (d) above [3].