



UNIVERSITY OF SWAZILAND  
FACULTY OF HEALTH SCIENCES  
DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE



## SUPPLEMENTARY EXAMINATION

TITLE OF PAPER	ENVIRONMENTAL MANAGEMENT	POLLUTION
COURSE CODE	EHM307	
DURATION	2 HOURS	
DATE	JULY 2018	
TOTAL NUMBER OF MARKS	100	
INSTRUCTIONS	<ol style="list-style-type: none"><li>1. DO NOT OPEN THIS PAPER UNTIL YOU ARE INSTRUCTED TO DO SO.</li><li>2. ANSWER QUESTION ONE AND ANY OTHER THREE QUESTIONS.</li><li>3. BEGIN YOUR ANSWERS TO EACH QUESTION ON A FRESH PAGE.</li><li>4. ENSURE THAT ALL ANSWER SHEETS ARE NUMBERED CORRECTLY.</li><li>5. POOR HANDWRITING AND CARELESSNESS IN ENGLISH LANGUAGE GRAMMAR SHALL RESULT IN LOSS OF MARKS.</li><li>6. ANY FORM OF MISCONDUCT DURING THE EXAMINATION IS PUNISHABLE IN LINE WITH RELEVANT ACADEMIC REGULATIONS.</li></ol>	

**QUESTION ONE [25 MARKS]**

1. The two main primary air pollutants that are responsible for acid deposition, which often leads to significant environmental effects are;
  - (a)  $\text{NO}_2$  and  $\text{SO}_2$
  - (b)  $\text{NO}$  and most sulphate and nitrate salts
  - (c)  $\text{SO}_2$  and  $\text{NO}_x$
  - (d) Most hydrocarbons and  $\text{NO}_x$
2. When a chemical builds up to higher levels in living organisms than levels found in the environment, it is said to undergo;
  - (a) Chemical-induced dissolved oxygen depletion
  - (b) Biomagnification
  - (c) Bioaccumulation
  - (d) Biochemical magnification
3. Which of the following statements best describes one of the means by which acid deposition can lead to disappearance of fish?
  - (a) The deposition of acids into lakes and streams raises the pH, which then leads to depletion of dissolved oxygen on which fish depends.
  - (b) Fish die because when they come in contact with acidic water they begin to develop small burn wounds that are in most cases sources of further infection.
  - (c) Acidic rainwater dissolves toxic elements, such as aluminum, from soils and rocks, which are carried in runoff. In streams and lakes, these toxic elements are the ones that lead to many effects, which include difficulty in breathing.
  - (d) Acid deposition in streams and lakes raises the pH, which interferes with fish migratory patterns.
4. Acid deposition is known to lead to negative effects on birds living near acid contaminated lakes. Choose one statement that correctly describes one of the effects.
  - (a) For aquatic birds to give offspring they need a constant supply of food (fish); however, since the acids wipe away fish, the birds fail to lay eggs.
  - (b) Aquatic birds often lay eggs not far from the areas where they feed, and usually such areas are wet. Therefore, when the acid-contaminated water gets in contact with the eggs, the eggs fail to hatch.
  - (c) Despite the possibility that there could be little food left for the birds, they are still able to lay eggs, except that the eggs are defective.
  - (d) Acid deposition leads to wiping away of vegetation, and so, birds do not have any material to use when making nests. They end up laying eggs in the open where there is no shelter and other animals eat them.
5. There are four most corrosive and harmful pollutants that often lead to significant damage to materials. Choose one that does not fall into this category.
  - (a)  $\text{SO}_2$
  - (b)  $\text{O}_3$
  - (c)  $\text{H}_2\text{O}_2$
  - (d)  $\text{HNO}_3$
6. A commuter in heavy traffic suddenly felt a severe headache, with dizziness and fatigue. On arrival at the hospital, she was examined and found to have inhaled a number of air pollutants, especially
  - (a)  $\text{CO}_2$
  - (b)  $\text{SO}_2$
  - (c)  $\text{SO}_3$
  - (d)  $\text{CO}$

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7. In radiation temperature inversion, at what time of the day would you expect to find higher levels of pollutants?
    - (a) 0700 – 1000Hrs
    - (b) 1000 – 1300Hrs
    - (c) 1300 – 1600Hrs
    - (d) 1600 – 1900Hrs
  8. In Integrated Pest Management [IPM], the central goal is;
    - (a) To focus on the use of biological techniques in controlling pests that attack especially ready-to-harvest crops.
    - (b) To apply as much pesticide as possible in order to ensure that all pests are eliminated so as to ensure a good harvest.
    - (c) The application of environmental controls in order to alter the biotic and abiotic conditions in crops, making them inhospitable to pests.
    - (d) The application of cultural, environmental, genetic and chemical techniques in order to reduce pest populations to levels that do not cause economic damage, while protecting human health and the environment.
  9. On a sunny day, at what time of the day would you expect to find higher levels of photochemical smog?
    - (a) 0600 – 0900Hrs
    - (b) 0900 – 1200Hrs
    - (c) 1500 – 1800Hrs
    - (d) 1200 – 1500Hrs
  10. Industrial smog is common in many urban areas with a combination of factors, especially in;
    - (a) Industrial cities in moist and hot climates
    - (b) Industrial cities in moist and cold climates
    - (c) Industrial cities in dry and hot climates
    - (d) Industrial cities in dry and cold climates
  11. Most dry acid deposition (which occurs fairly near industrial sources) takes place within;
    - (a) 3–4 days of emission
    - (b) 2–3 days of emission
    - (c) 4–5 days of emission
    - (d) 5–6 days of emission
  12. The primary pollutants that are the main precursors of acid deposition are;
    - (a) SO<sub>2</sub> and NO
    - (b) NO<sub>x</sub> and SO<sub>2</sub>
    - (c) CO and SO<sub>2</sub>
    - (d) SO<sub>2</sub> and SO
  13. Secondary acid deposition pollutants do not include;
    - (a) H<sub>2</sub>SO<sub>4</sub>
    - (b) CO<sub>2</sub>
    - (c) HNO<sub>3</sub>
    - (d) SO<sub>4</sub><sup>2-</sup>
  14. Secondary acid deposition pollutants often remain in the atmosphere for;
    - (a) 4–16 days depending mostly on prevailing winds
    - (b) 2–14 days depending mostly on prevailing winds
    - (c) 6–18 days depending mostly on prevailing winds
    - (d) 8–20 days depending mostly on prevailing winds
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15. Acid deposition has a pH of;
  - (a) Less than 4.6
  - (b) Less than 5.6
  - (c) Less than 3.6
  - (d) Less than 2.6
16. Unpolluted rain is mildly acidic with a pH of;
  - (a) About 5.6
  - (b) About 4.6
  - (c) About 3.6
  - (d) About 2.6
17. Most wet acid deposition takes place within;
  - (a) 4–14 days of emission
  - (b) 6–16 days of emission
  - (c) 8–18 days of emission
  - (d) 10–20 days of emission
18. South Africa gets 80% of its energy from burning coal, Ghana gets 80% from hydroelectric power, China gets 80% from solar and Russia gets 80% from natural gas. The source of high levels of acid deposition must be;
  - (a) South Africa
  - (b) Russia
  - (c) Ghana
  - (d) China
19. In aquatic systems that experience acid deposition, fish cannot be found;
  - (a) Below a pH of 4.5
  - (b) Below a pH of 5.5
  - (c) Below a pH of 6.5
  - (d) Below a pH of 7.5
20. The destructive impacts of acid deposition on fish include,
  - (a) Killing fish through excessive mucus formation
  - (b) Burns on their skin (especially since fish has soft skin)
  - (c) Inhibition of diffusion of oxygen into the water body
  - (d) Killing fish by reducing the temperature of the water body below the tolerance level of fish
21. Chemicals or substances emitted directly into the air from natural processes and human activities, at concentrations high enough to cause harm are;
  - (a) Secondary pollutants
  - (b) Tertiary pollutants
  - (c) Airborne pollutants
  - (d) Primary pollutants
22. In the atmosphere, some pollutants react with one another and with other natural components of air to form new harmful chemicals, called;
  - (a) Primary pollutants
  - (b) Tertiary pollutants
  - (c) Airborne pollutants
  - (d) Secondary pollutants
23. One of the causes of indoor air pollution is the use of;
  - (a) Batteries
  - (b) Paints
  - (c) Nail polish
  - (d) Cow dung

24. One of the reasons why there may be less air pollution in rural areas compared to urban areas is linked with;
- Education
  - HIV/AIDS
  - Health status
  - Vehicles
25. According to the World Health Organization (WHO), each year indoor air pollution kills about;
- 1.6 million people
  - 4.6 million people
  - 2.6 million people
  - 3.6 million people

### QUESTION TWO [25 MARKS]

- State any four indoor air pollutants that are released from combustion sources [4].
- You are an Environmental Management Officer working at the National Air Pollution Monitoring Laboratory in Matsapha. Due to financial constraints, many of the damaged equipment in your laboratory has not been replaced. In order to monitor levels of air pollution, you decide to rely on your knowledge of the impacts of air pollution on vegetation. Luckily for you, within and around Matsapha, the following plant species/organisms can be found; apple trees, alfalfa, frogs, lichens, conifers and Chinese apricot.
  - Which plant species/organisms are you going to use to study air pollution? [2]
  - Explain how you can use the plants/organisms that you have stated in question 2(a) above to draw conclusions whether air pollution is increasing or decreasing in Matsapha, without using chemical analysis [5].
  - Describe one property of the plants/organisms that you have stated in question 2(a), which makes them particularly useful in air pollution monitoring [4].
- What is the role played by sunlight in reducing the amount of air pollutants in a given place? [3]
- Under certain atmospheric conditions, the role played by sunlight, as you have described in question 3 above, is completely reversed, resulting in the concentration of air pollutants near the ground.
  - State the term of the phenomenon that often results in concentration of pollutants near the ground [2].
  - Describe how the phenomenon that you have stated in question 4(a) above leads to concentration of air pollutants in a particular area close to the ground [5].

### QUESTION THREE [25 MARKS]

- What is cultural eutrophication? [3]
  - State four examples of oxygen demanding wastes [4].
  - Discuss the main destructive impacts of oil on aquatic birds [5].
  - An oil spill in the ocean is known to result to significant negative environmental and economic impacts. Sometimes, however, the impacts can be minimal. Discuss any three factors that can lead to such variances [6].
- State any three factors affecting the amount of pollution reaching groundwater [3].
  - State any four sources of groundwater pollution [4].

### QUESTION FOUR [25 MARKS]

1. In sheer quantity, natural pollutants often outweigh the products of human activities; however, products of human activities generally create the most significant long-term threats to the biosphere. Why? [5].
2. What is a trap crop? [3].
3. Describe one reason why you are more likely to find lower populations of pests in farms where heteroculture is practiced than in monoculture farms [2].
4. How does low product durability contribute to ever increasing volumes of municipal solid waste? [3]
5. Describe one property of polychlorinated biphenyls (PCBs) that led to their widespread use, such as in insulation of electrical equipment, deep-fat fryers, etc. [2].
6. The use of dispersing agents and fire are some of the easiest chemical methods that can be applied in cleaning oil spills. There is a catch; however, with each of these two. What is the catch? [4].
7. Nitrates are considered to be one of the dangerous pollutants in drinking water, especially in infants. Why? [4].
8. Give one possible reason why NO particularly rises from 0600hrs to slightly after 0800hrs, after which it drops significantly [2].

### QUESTION FIVE [25 MARKS]

1. State any four sources of oil entering the oceans [4].
2. State any four sources of plastics that end up in oceans [4].
3. State any four health problems associated with consuming contaminated groundwater [4].
4. State any four examples of organic wastes that often stimulate the growth of oxygen-demanding decomposing bacteria in water [4].
5. State any five examples of products into which polybrominated diphenyl ethers (PBDEs) are still being incorporated [5].
6. PBDEs are known to cause health effects on cats, fish, seals, and other marine mammals. Describe some of the effects that have been observed in cats [4].