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

SUPPLENTARY EXAMINATION PAPER
JULY 2016

TITLE OF PAPER	ENVIRONMENTAL POLLUTION MANAGEMENT
COURSE CODE	EHM 307
DURATION	2 HOURS
TOTAL NUMBER OF MARKS	75
INSTRUCTIONS	1. DO NOT OPEN THIS PAPER UNTIL YOU ARE INSTRUCTED TO DO SO BY THE INVIGILATOR. 2. QUESTION ONE IS COMPULSORY. CHOOSE TWO OTHER QUESTIONS IN ADDITION TO QUESTION ONE. 3. BEGIN YOUR ANSWERS TO EACH QUESTION ON A FRESH PAGE OF THE ANSWER BOOKLET. ENSURE THAT ALL PAGES OF THE ANSWER BOOKLET ARE NUMBERED CORRECTLY. 4. POOR HANDWRITING AND CARELESSNESS IN ENGLISH LANGUAGE GRAMMAR SHALL RESULT IN LOSS OF MARKS. 5. NECESSARY PENALTIES SHALL BE APPLIED AGAINST ANY FORM OF MISCONDUCT DURING THE COURSE OF THE EXAMINATION.

QUESTION ONE [25 MARKS]

1. The Exxon Valdez oil spill and the Deepwater Horizon oil rig blowout are currently the major incidents that are known to have led to major oil pollution problems in oceans. Using your knowledge of these two case studies, answer the questions below.

1.1 The Exxon Valdez oil spill occurred on [**1**];

(a) March 24, 1979
(b) March 24, 1989
(c) March 24, 1999
(d) March 24, 2009

1.2 When the tanker hit submerged rocks, a lot of crude oil was released into Alaska's Prince William Sound. Recently, it was estimated that the amount of crude oil that was released was [**1**];

(a) 21 million litres
(b) 31 million litres
(c) 41 million litres
(d) 51 million litres

1.3 The oil spill blackened a large area of pristine and biologically rich Alaskan coastline. This area is estimated to be [**1**];

(a) 2,200km
(b) 3,200km
(c) 4,200km
(d) 5,200km

1.4 Although the oil from the Exxon Valdez spill killed large numbers of fish, fish eggs, shellfish, sea otters, orcas (killer whales), and harbour seals, the most affected animals were seabirds. The estimated number of seabirds that were killed is about [**1**];

(a) 150,000
(b) 250,000
(c) 350,000
(d) 450,000

2. The economy of Swaziland is largely dependent on agricultural activities, such as sugar cane farming, cotton production and maize farming. In many such activities, four types of chemical pesticides are used as shown in **Figure 1**. Study the diagram carefully and use it (along with your knowledge of pesticides) to answer the questions below.

2.1 The chemical type that is extremely difficult to break down once it is released to the environment is [**1.5**];

(a) Type A
(b) Type B
(c) Type C
(d) Type D

2.2 The chemical type that is more likely to be biomagnified along the food chain is [**1.5**];

(a) Type A
(b) Type B
(c) Type C
(d) Type D

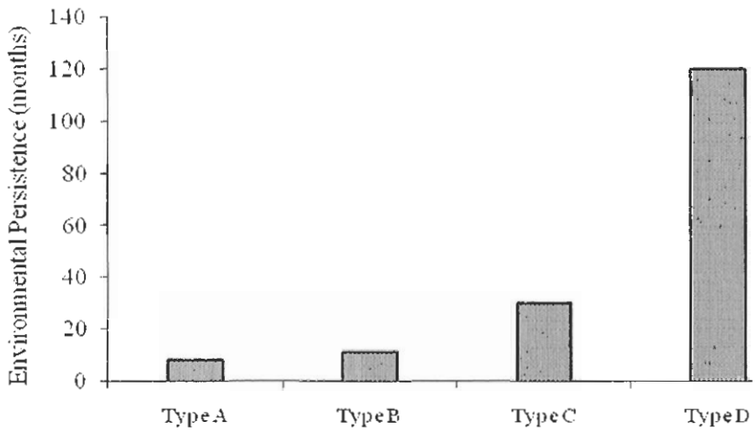

Figure 1: Environmental persistence of four types of chemicals used in farming activities in Swaziland

2.3 The chemical type that is more likely to be highly soluble in lipid materials, including animal fat is [**1.5**];

(a) Type A
(b) Type B
(c) Type C
(d) Type D

2.4 The chemical type that is likely to have the lowest water solubility is [**1.5**];

(a) Type A
(b) Type B
(c) Type C
(d) Type D

2.5 The chemical types that are likely to have high water solubility (and thus after application to a field, they can runoff in rainwater readily or percolate into groundwater) are [**1.5**];

(a) Types A and B
(b) Types A and C
(c) Types A and D
(d) Types B, C and D

2.6 The chemical type that is likely to be detected in places like northern Finland even though they are not used there is **[1.5]**;
(a) Type A
(b) Type B
(c) Type C
(d) Type D

2.7 The chemical type that has been linked with reduced deposition of calcium in the eggshells of birds (peregrine falcons, bald eagles, brown pelicans, cormorants, gulls and ospreys) that feed on fish and of other smaller birds is **[1.5]**;
(a) Type A
(b) Type B
(c) Type C
(d) Type D

2.8 The chemical type that (even though it is still being used in Swaziland) has been banned or drastically restricted or is being considered for such actions because of its ability to cause cancer, birth defects, neurological disorders and damage to wildlife and environment is **[1.5]**;
(a) Type A
(b) Type B
(c) Type C
(d) Type D

3. The Love Canal case study is one of the major examples that illustrate the fact that poor management of hazardous waste can often lead to major environmental health problems. Using your knowledge of this case study, answer the questions below.

3.1 The Love Canal, built in the 1890s, was never used as a canal. Then, starting in 1942, Hooker Chemicals Company used it in dumping about **[1]**;
(a) 32 000 tons of hazardous waste
(b) 42 000 tons of hazardous waste
(c) 22 000 tons of hazardous waste
(d) 52 000 tons of hazardous waste

3.2 The more than 200 hazardous chemicals that were dumped in the canal included **[1]**;
(a) Oxygen-demanding waste from large tanneries
(b) Pesticides
(c) Plant nutrients
(d) Sediment contaminated with salts

3.3 The Love Canal site was capped with clay and topsoil, and sold to Niagara Falls school board. Between 1954 and 1959, the site was developed and amongst these developments, were **[1]**;
(a) Car manufacturing factories
(b) Schools
(c) Fish hatcheries
(d) Shopping malls

3.4 In the 1960s, the dumped hazardous waste began to affect residents within the vicinity of the site by [1];
   (a) Weakening concrete walls
   (b) Corroding underground electricity cables
   (c) Overflowing into the basements and back yards
   (d) Overflowing into fields where it began to affect yields of crops like maize, lettuce, potatoes, etc.

3.5 The extent of the impact of hazardous waste from the Love Canal site was such that city authorities ended up [1];
   (a) Banning the consumption of vegetables grown within the vicinity of the affected site
   (b) Banning the use of boreholes for 25 years
   (c) Conducting tests to determine health impacts on all residents within the vicinity of the affected site
   (d) Destroying homes closest to the canal

4. The leading causes of water pollution are [1];
   (a) Wastewater treatment facilities
   (b) Oxygen demanding wastes
   (c) Landfills
   (d) Agricultural activities

5. The third biggest source of water pollution is [1];
   (a) Mining
   (b) The food industry
   (c) Heavy metals
   (d) Sediment

6. If a lake is low in nutrients and its water is clear, it is said to be [1];
   (a) Trophic
   (b) Oligotrophic
   (c) Limnetic
   (d) Benthic

7. Naturally, in an unpolluted stream [1];
   (a) The level of biochemical oxygen demand (BOD) is higher than dissolved oxygen (DO)
   (b) The level of DO is higher than the level of BOD
   (c) The levels of DO and BOD are the same
   (d) A high level of BOD is an indication that the stream is polluted with salts acids, especially from gold mining activities.

QUESTION TWO [25MARKS]

1. Polybrominated diphenyl ethers (PBDEs) are incorporated (often in large amounts) into electrical equipment, electronics, plastics within television sets, furniture foam, carpets, textiles, etc. In fact, generally, PBDEs are found in house dust. Based on this information, answer the following questions;

1.1 If there are four children in a family, whose ages are 1 year, 7 years, 13 years and 15 years, which member of the family is more likely to be found with higher levels of PBDEs in his/her body is? [2]

1.2 Discuss any reasons that influenced your choice in **question 1.1** above [2].

1.3 There are four different kinds of animals in a home, namely; a dog, a cat, a horse and a donkey. Amongst these, which one(s) is/are more likely to be found with higher levels of PBDEs in its/their fatty tissues? [2]

1.4 Discuss any reasons that influenced your choice in **question 1.3** above [2].

2. Water pollutants can originate from a wide variety of sources and can lead to major health and environmental problems. **Table 1** below lists some of the types, examples and major sources of water pollutants. Using your knowledge of water pollutants, provide fill in (c, iii, 3, 4, 5, 8, 9) the gaps [7].

Table 1: Major water pollutants and their sources

Type/effects	Examples	Major sources
a) Oxygen-demanding wastes	(i) Biodegradable animal wastes (ii) Plant debris	1. Sewage 2. Animal feedlots 3. 4. 5.
b) Thermal	(iii)	6. Electric power plants 7. Industrial plants
c)	(iv) Bacteria (v) Viruses	8. 9.

3. The Exxon Valdez oil spill was a tragic and costly accident; however, it led to improvements in oil tanker safety and clean-up strategies. Describe any two such improvements [4].
4. Pumping polluted groundwater water to the surface, cleaning it and returning it to the aquifer is extremely expensive. Recent attempts indicate that it may take 50-1000 years of continuous pumping before all the pollution is forced to the surface. Therefore, a number of strategies that can be employed to prevent contamination have been proposed. Discuss any three such strategies [6].

QUESTION THREE [25 MARKS]

1. Coastal areas are said to be the ones that are more polluted than perhaps more inland areas. Discuss any two reasons that may have contributed to this observation [**4**].
2. State any three examples of first generation pesticides [**3**].
3. State one of the reasons that prompted farmers to abandon some of the first generation pesticides [**2**].
4. More often than not, ½ to ¾ of the sprayed pesticide never reach the ground. Why? [**2**].
5. Between farmers in South America (developing countries) and those in Sweden (a developed country), in which group are you likely to find more pesticide-related deaths? [**2**].
6. Describe any two reasons for your answer in **question 5** above [**4**].
7. The amount of pollution that reaches groundwater is said to be dependent on a number of factors. State any three such factors [**3**].
8. **Figure 2** shows the five levels used to describe water quality. Study the diagram carefully and answer the questions that follow.

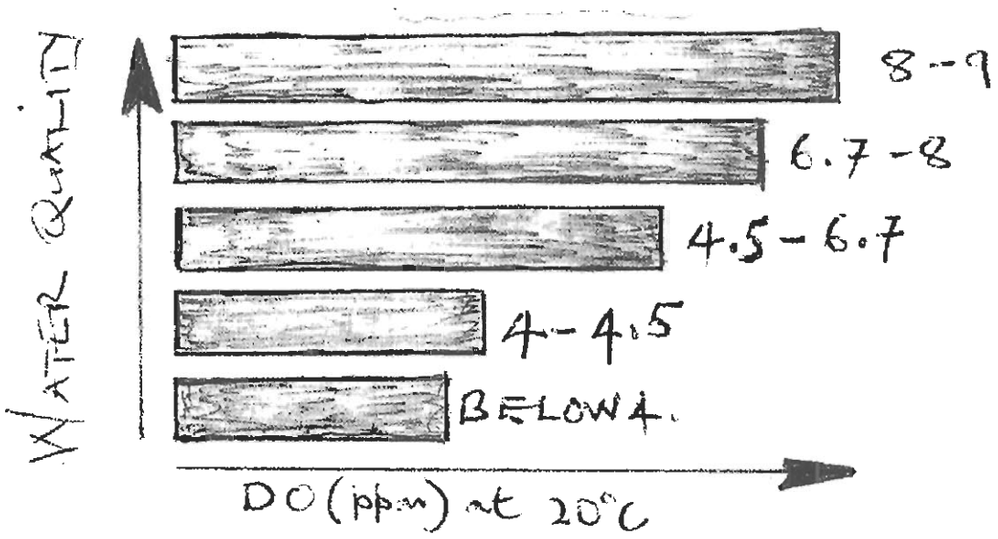

Figure 2: Relationship between dissolved oxygen content and water quality

8.1 At what level can you expect to find organisms such as worms, bacteria and fungi? [**2**]

8.2 What type of water pollutants are likely to be associated with your response in **question 8.1** above? [**2**]

8.3 In order to determine the water quality and categorize it as shown in **Figure 2**, water quality specialists often do not need to determine all pollutants in water. What is the commonly used test? [**1**]

QUESTION FOUR [25 MARKS]

1. Discuss any;

1.1 Two impacts of acid deposition on forest soils [**4**]

1.2 Two impacts of acid deposition on aquatic ecosystems **[4]**

2. In pesticide application, what do you understand by the expression 'economic threshold'? [**2**].
3. Describe one reason why you are more likely to find lower populations of pests in farms where heteroculture is practiced [**2**].
4. In an attempt to control pests in his fields, a poor farmer (who is unable to purchase expensive pesticides) practices crop rotation in order to control pests. Describe two ways by which this farmer will be able to control pests using this technique **[4]**.
5. With regard to pest control, discuss the meaning of the following statement "A little knowledge of pest nutrient requirements, soil nutrient levels and plant nutrient content can become a useful ally" **[3]**.
6. What is a trap crop? **[3]**.
7. State any three immediate health effects of air pollution **[3]**.