UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE

FINAL EXAMINATION

TITLE OF PAPER	ENVIRONMENTAL POLLUTION MANAGEMENT
COURSE CODE	EHS330
DURATION	TWO HOURS
DATE	MAY 2019
TOTAL NUMBER OF MARKS	100
INSTRUCTIONS	1. DO NOT OPEN THIS PAPER UNTIL YOU ARE INSTRUCTED TO DO SO. 2. ANSWER QUESTION ONE AND ANY OTHER THREE QUESTIONS. 3. BEGIN YOUR ANSWERS TO EACH QUESTION ON A FRESH PAGE. 4. POOR HANDWRITING AND CARELESSNESS IN ENGLISH LANGUAGE GRAMMAR SHALL RESULT IN LOSS OF MARKS. 5. ANY FORM OF MISCONDUCT DURING THE EXAMINATION IS PUNISHABLE IN LINE WITH RELEVANT ACADEMIC REGULATIONS.

QUESTION ONE [25 MARKS]

1. PCBs stands for;
   (a) Photo-chemical biphenyls
   (b) Photolysed-chemical byproducts
   (c) Polychlorinated biphenyls
   (d) Poly-coated chemical byproducts
2. PCBs;
   (a) Were banned 60 years ago
   (b) Were banned 90 years ago
   (c) Were banned 120 years ago
   (d) Were banned 30 years ago
3. One of the following is associated with the uses of PCBs. This is the;
   (a) Manufacture of paints
   (b) Manufacture of plastics
   (c) Manufacture of tires
   (d) Manufacture of mercury for laboratory use
4. One of the following is associated with the impacts of PCBs. This is;
   (a) Skin rashes
   (b) Bioaccumulative
   (c) Eye cataracts
   (d) Hair loss
5. The environmental persistence of PCBs is related to;
   (a) The amount released to the environment
   (b) The type of soil on which it is released
   (c) The number of chlorine atoms
   (d) Climatic conditions in the environment where it is released
6. One of the foods through which exposure to PCBs can occur is;
   (a) Potatoes
   (b) Leafy vegetables
   (c) Dry cereals
   (d) Fish
7. The maximum level of PCBs allowed in the type of food you have chosen in question 6 above is;
   (a) 2ppm
   (b) 4ppm
   (c) 6ppm
   (d) 8ppm
8. With PCBs, the concern is for chemicals;
   (a) That are still being manufactured and used presently
   (b) That have persisted for many years after they were banned
   (c) That are soluble in water
   (d) That cause acid deposition
9. PBDEs stands for;
   (a) Photobiphenyl destructive ethers
   (b) Polybiphenyl – *D* ethers
   (c) Polybrominated diphenyl ethers
   (d) Polybrominated – *D* ethers

10. In a household, you are likely to find high amounts of PBDEs in;
    (a) In toilet paper
    (b) In food harvested from fertilized fields
    (c) Curtains
    (d) Carpets
11. PBDEs are incorporated in large amounts in;
    (a) Furniture foam
    (b) Tires
    (c) Windscreens
    (d) Incinerator fuel
12. PBDEs serve the important function of;
    (a) Preventing termite damage
    (b) Preventing or retarding fires
    (c) Preventing accumulation of carbon monoxide in households using coal in fire places
    (d) Preventing corrosion of metals
13. The highest levels of PBDEs may be found in people that are;
    (a) 8 years old
    (b) 12 years old
    (c) 4 years old
    (d) 16 years old
14. One of the impacts of PBDEs in animals may be;
    (a) Damaged eyes
    (b) Damaged liver, especially due to the high toxicity of PBDEs
    (c) Damaged limbs
    (d) Damaged thyroid
15. In domestic animals, the highest levels of PBDEs are likely to be found in;
    (a) Cats
    (b) Dogs
    (c) Chickens
    (d) Goats
16. One of the uses of perfluorooctane sulfunates (PFOS) is;
    (a) Oil refining
    (b) In pizza boxes
    (c) Metal smelting
    (d) Wastewater treatment
17. In the laboratory, researchers observed that one of the impacts of PFOS in animals is;
    (a) Blood poisoning
    (b) Suffocation
    (c) Loss of appetite
    (d) Changes to skin colour
18. Most dry acid deposition (which occurs fairly near the industrial sources) takes place within;
    (a) 3–4 days of emission
    (b) 4–5 days of emission
    (c) 5–6 days of emission
    (d) 2–3 days of emission

19. The primary pollutants that are the main precursors of acid deposition are;
    (a) NO_x and SO_2
    (b) SO_2 and NO
    (c) CO and SO_2
    (d) SO_2 and SO
20. Secondary acid deposition pollutants do not include;
    (a) H_2SO_4
    (b) CO_2
    (c) HNO_3
    (d) SO_4^{-2}
21. Secondary acid deposition pollutants often remain in the atmosphere for;
    (a) 4–16 days depending mostly on prevailing winds
    (b) 6–18 days depending mostly on prevailing winds
    (c) 2–14 days depending mostly on prevailing winds
    (d) 8–20 days depending mostly on prevailing winds
22. Acid deposition has a pH of;
    (a) Less than 4.6
    (b) Less than 3.6
    (c) Less than 2.6
    (d) Less than 5.6
23. Unpolluted rain is mildly acid with a pH of;
    (a) About 5.6
    (b) About 4.6
    (c) About 3.6
    (d) About 2.6
24. Most wet acid deposition takes place within;
    (a) 6–16 days of emission
    (b) 4–14 days of emission
    (c) 8–18 days of emission
    (d) 10–20 days of emission
25. 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 worst acid deposition must be originating in;
    (a) Russia
    (b) Ghana
    (c) South Africa
    (d) China

QUESTION TWO [25 MARKS]

1. **Figure 3** shows the impacts of one of the families of POPs in an aquatic food chain. Study the diagram carefully and answer the questions that follow.

1.1 State the three main families of POPs [6].

1.2 State POPs in full [2].

1.3 Which family of POPs is usually associated with problems shown in **Figure 3**? [2]

1.4 What is the name of the process given to the phenomenon whereby the level of a chemical becomes progressively higher moving through the food web, as shown in **Figure 3**? [2]

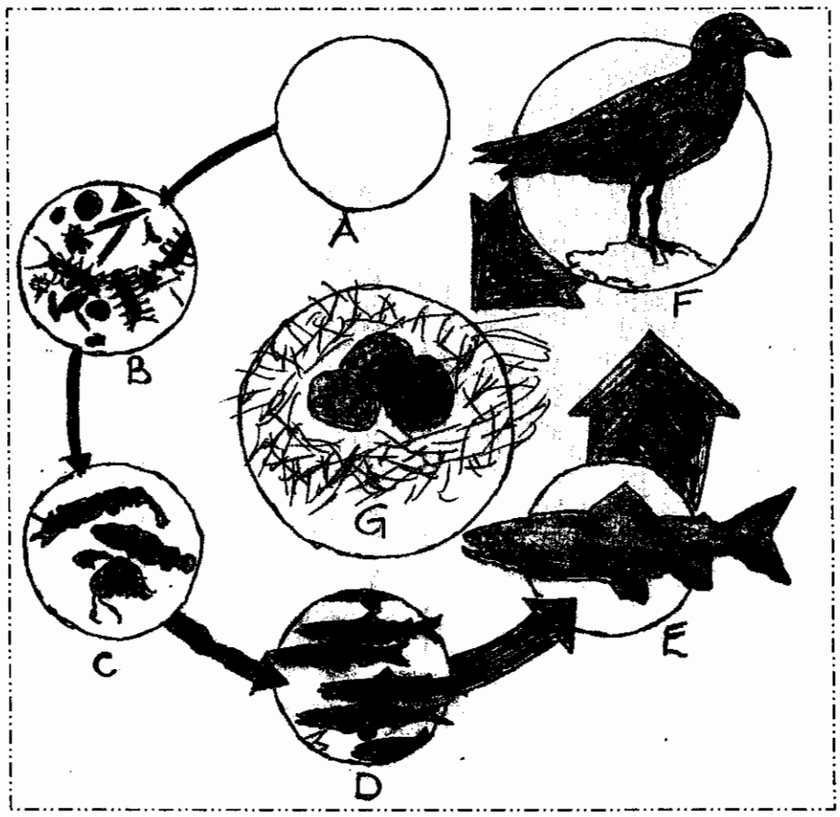

Figure 3: Impacts of one of the families of POPs in an aquatic food chain. Note: A – water; B – phytoplankton; C – zooplankton; D – rainbow smelt; E – lake trout; F – herring gull (a fish-eating bird); and G – herring gull eggs; arrows – concentration of POPs from one state to another.

1.5 During the 1950s and 1960s, populations of fish- eating birds, such as osprey, cormorant, brown pelican and bald eagles dropped drastically. Research showed that a chemical derived from dichlorodiphenyltrichloroethane (DDT) was the major cause of this observation. Using **Figure 3**, explain how DDT affected bird populations [5].

2. Discuss any two destructive impacts of algal blooms in coastal areas [4].
3. State any four sources of oil entering the oceans [4].

QUESTION THREE [25 MARKS]

1. 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].
2. State any five two sources of plastics that end up in oceans [2].
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. The following statements relate to water pollution problems. In each case determine whether the given statement is true (**T**) or false (**F**) [10].
   (a) Problems relating to oxygen sag curve and the curve of oxygen demand are associated with lakes or reservoirs.
   (b) Eutrophication is mainly a problem that is encountered in streams/rivers.

(c) In an unpolluted water body, dissolved oxygen is higher that biochemical oxygen demand.
(d) Dissolved oxygen levels often begin to fall immediately below the source of pollution.
(e) Low dissolved oxygen levels causes more mass fish deaths than any other single agent, including oil spills.
(f) Point sources of water pollution are harder to control than nonpoint sources.
(g) High BOD in a water body often indicates human activity; however, naturally water contains some BOD.
(h) More than a quarter of the world's population depends on groundwater for drinking water.
(i) The effects of oxygen demanding wastes are always the same, regardless of volume of water polluted, flow and temperature.
(j) Rivers and lakes that have clear water and low biological productivity are said to be oligotrophic.

5. State any three examples of point source pollution [3].

QUESTION FOUR [25 MARKS]

1. What is a sanitary landfill? [3]
2. Discuss any five problems associated with the use of sanitary landfills [10].
3. Describe three problems associated with end of pipe pollution control strategies [6].
4. State any six examples of non-point source pollution [6].

QUESTION FIVE [25 MARKS]

1. State any five examples of first generation pesticides [5].
2. Describe one reason that prompted farmers to abandon some of the first generation pesticides [2].
3. More often than not, ½ to ¾ of the sprayed pesticide never reach the ground. Why? [2].
4. 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].
5. Describe any four reasons for your answer in question 4 above [8].
6. State any six health problems associated with consuming contaminated groundwater [6]