UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE

RESIT EXAMINATION

TITLE OF PAPER	ENVIRONMENTAL POLLUTION MANAGEMENT
COURSE CODE	EHS330
DURATION	TWO HOURS
DATE	JULY 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 1 [25 MARKS]

1. To be considered safe for drinking, a 100-milliliter (about 1/2-cup) sample of water should contain;
   (a) No colonies of coliform bacteria
   (b) 0 – 5 colonies of coliform bacteria
   (c) 5 – 10 colonies of coliform bacteria
   (d) 10 – 20 colonies of coliform bacteria
2. To be considered safe for swimming, such a water sample should contain;
   (a) No more than 400 colonies of coliform bacteria
   (b) No more than 600 colonies of coliform bacteria
   (c) No more than 800 colonies of coliform bacteria
   (d) No more than 200 colonies of coliform bacteria
3. The leading causes of water pollution are
   (a) Wastewater treatment facilities
   (b) Agricultural activities
   (c) Oxygen demanding wastes
   (d) Landfills
4. The third biggest source of water pollution is
   (a) The food industry
   (b) Heavy metals
   (c) Mining
   (d) Sediment
5. If a lake is low in nutrients and its water is clear, it is said to be
   (a) Oligotrophic
   (b) Atrophic
   (c) Limnetic
   (d) Benthic
6. Naturally, in an unpolluted stream
   (a) The level of biochemical oxygen demand (BOD) is higher than dissolved oxygen (DO)
   (b) The levels of DO and BOD are the same
   (c) A high level of BOD is an indication that the stream is polluted with salts acids, especially from gold mining activities.
   (d) The level of DO is higher than the level of BOD
7. According to statistics provided in your textbook, the World Health Organization (WHO) estimates that almost;
   (a) 7 billion people do not have access to clean drinking water
   (b) 1 billion people do not have access to clean drinking water
   (c) 3 billion people do not have access to clean drinking water
   (d) 5 billion people do not have access to clean drinking water
8. In most less-developed countries, the two major causes of stream pollution are;
   (a) Agriculture and mining
   (b) The extensive use of pesticides and fertilizers
   (c) Untreated sewage and industrial waste
   (d) Infectious agents and hazardous waste

9. 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
10. The destructive impacts of acid deposition on fish include,
   (a) Burns on their skin (especially since fish has soft skin)
   (b) Inhibition of diffusion of oxygen into the water body
   (c) Killing fish by reducing the temperature of the water body below the tolerance level of fish
   (d) Killing fish through excessive mucus formation
11. 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) Primary pollutants
   (c) Tertiary pollutants
   (d) Airborne pollutants
12. 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) Secondary pollutants
   (d) Airborne pollutants
13. One of the causes of indoor air pollution is the use of;
   (a) Cow dung
   (b) Batteries
   (c) Paints
   (d) Nail polish
14. One of the reasons why there may be less air pollution in rural areas compared to urban areas is linked with;
   (a) Education
   (b) HIV/AIDS
   (c) Health status
   (d) Vehicles
15. According to the WHO, each year indoor air pollution kills about';
   (a) 4.6 million people
   (b) 1.6 million people
   (c) 2.6 million people
   (d) 3.6 million people
16. A colourless, odourless, and highly toxic gas that forms during the incomplete combustion of carbon-containing materials is;
   (a) SO_2
   (b) O_3
   (c) CO
   (d) CO_2

17. A pollutant known to combine with haemoglobin in red blood cells, resulting in inhibition of normal binding of oxygen with haemoglobin molecules is;
    (a) CO
    (b) NO
    (c) NO_2
    (d) SO_2
18. An air pollutant whose destructive effects include reduction of the ability of blood to transport oxygen to body cells and tissues is;
    (a) HNO_3
    (b) SO_2
    (c) CO_2
    (d) CO
19. About 93% of this pollutant in the atmosphere is the result of the natural carbon cycle. The rest comes from human activities, mostly the burning of fossil fuels and the clearing of forests and grasslands. This pollutant is;
    (a) NO
    (b) CO_2
    (c) N_2
    (d) NO_2
20. A colourless gas that forms when nitrogen and oxygen gas react under high-combustion temperatures in automobile engines and coal-burning power and industrial plants;
    (a) Sulfur dioxide
    (b) Carbon monoxide
    (c) Nitric oxide
    (d) Carbon dioxide
21. A greenhouse pollutant that is released from fertilizers and animal wastes, and also during the burning of fossil fuels is;
    (a) Nitrous oxide
    (b) Nitric oxide
    (c) Nitrogen dioxide
    (d) Nitrogen oxide
22. The irritation of eyes, nose, and throat, aggravation of lung ailments such as asthma and bronchitis, suppression of plant growth, and reduction of visibility are air pollution problems associated with;
    (a) Nitrous oxide
    (b) Nitric oxide
    (c) Nitrogen dioxide
    (d) Nitrogen oxides
23. Dust, wild fires, sea salt, coal-burning power and industrial plants, motor vehicles, and road construction are all sources of;
    (a) Sulfur dioxide
    (b) Suspended particulate matter
    (c) Acid deposition
    (d) Wet deposition

24. A colourless and highly reactive gas, which is a major ingredient of photochemical smog and also responsible for coughing and breathing problems, aggravation of lung and heart diseases, reduced resistance to colds and pneumonia, and irritation of eyes, nose, and throat is;
    (a) CO
    (b) O_2
    (c) O_3
    (d) CO_2
25. Damage to paints, paper, leather, and stone on buildings and statues is associated with;
    (a) Sulfur dioxide
    (b) Nitrous oxide
    (c) Carbon monoxide
    (d) Carbon dioxide

QUESTION TWO [25 MARKS]

1. A recent survey of the quality of water, at two different times, found that the percentage of anaerobic bacteria was 100% (time A) and 20% (time B) (black shade). The level of dissolved oxygen is shown in grey shade at the same times.

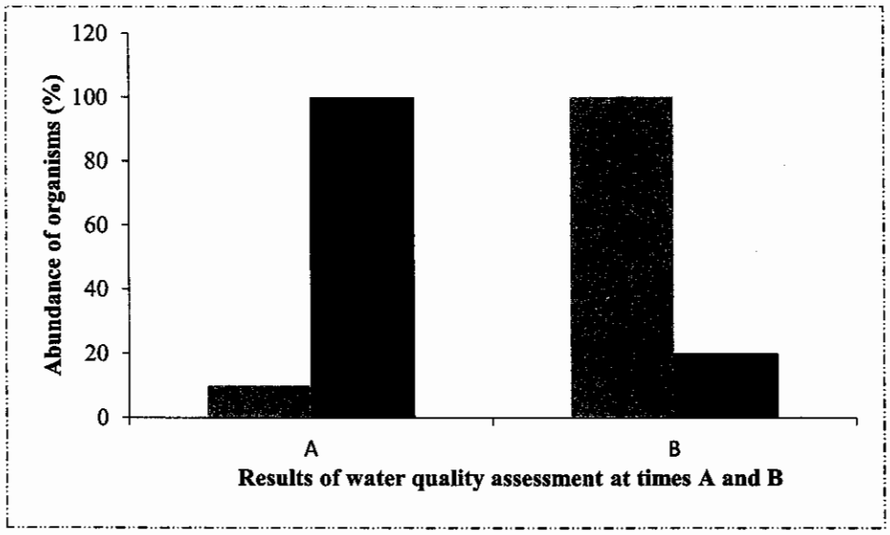

Figure 2: Results of water quality assessment in a water body at two different times (A and B)

    (a) At which time do you expect to find organisms such as trout and caddis fly larvae? [2]
    (b) Briefly describe any reasons for your choice in question 1.1 above [4]
    (c) State any five examples of wastes that are associated with the quality of water at time A [5]
    (d) State any two factors that could lead to changes in the quality of water resulting to conditions shown at time B [2].
    (e) For A and B, state the names of the zones that are associated with the problems shown [2]
    (f) State one type of surface water body that is associated with the water pollution problems shown in A and B [2]
    (g) State the category of water pollutants that is associated with the problems shown in Fig 1 [2].
2. In surface waters, organic pollutants are consumed by naturally occurring bacteria. As bacteria consume the organic matter, they help purify the waters and are therefore part of nature's system of restoration. Unfortunately, there is a catch. What is the catch? [6]

QUESTION THREE [25 MARKS]

1. What is water pollution? [2]
2. State any four causes of water pollution in non-industrialized nations [4].
3. State the five water quality levels shown in Figure 3 [5].

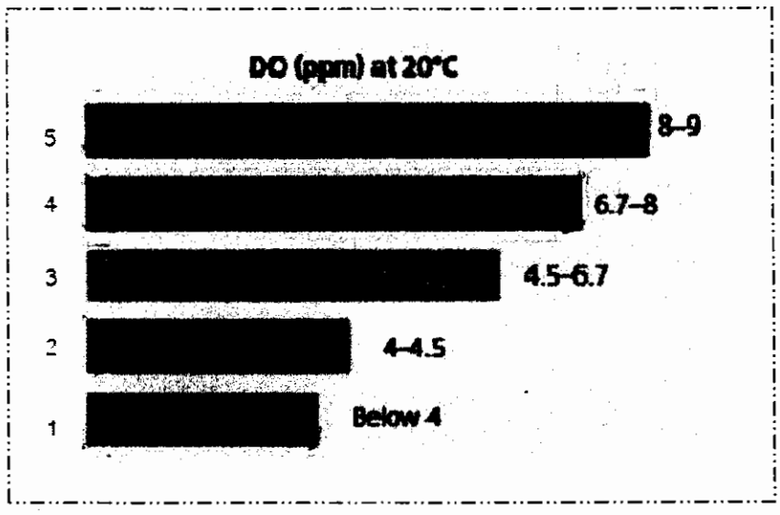

Figure 3: Water quality levels (Miller & Spoolman 2012)

4. Fifty years ago, a major chemical spillage incident occurred in an area and resulted in chemicals reaching groundwater, which was used by communities for domestic purposes. The use of borehole water in the affected communities was immediately stopped after the incident. However, recently, many new comers to the area started using these boreholes for their domestic purposes, including drinking.
   (a) Is the use of this water at this time, fifty years later, associated with any dangers? (Yes/no) [2]
   (b) State your reasons for stating either 'yes' or 'no' in **1 (a)** above [8].
5. State any four health problems associated with consuming contaminated groundwater [4]

QUESTION FOUR [25 MARKS]

1. Following the closure of the Usuthu Pulp Mill at Bhunya ten years ago, an industry that was dependant on logging, aquatic scientists have observed that fish populations have been steadily increasing in streams located in areas where logging is no longer occurring. Describe any four possible causes of the steady increase in fish populations [8]
2. What is solid waste? [2]
3. State any three sources of solid waste [3].
4. State any three examples of MSW [3].
5. MSW is a serious concern in many cities around the world due to a range of factors. Discuss any five such factors [5].
6. Hazardous waste is defined in terms of four main characteristics. State any four such characteristics [4].

QUESTION FIVE [25 MARKS]

1. What do you understand by the following terms: acute toxicity and chronic toxicity? [4]
2. State any five health effects that may be observed on people that consume water contaminated by arsenic [5].

3. State any five uses of arsenic [5]
4. State any five sources of arsenic [5]
5. State any six health effects that may be observed in people (children and/or adults) that have been exposed to lead [6]