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OF SCIENCE AND TECHNOLOGY

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QUALIFICATION : <b>BACHELOR OF SCIENCE</b>	
QUALIFICATION CODE: <b>07BOSC</b>	LEVEL: <b>7</b>
COURSE: <b>ENVIRONMENTAL CHEMISTRY</b>	COURSE CODE: <b>ENC702S</b>
DATE: <b>JANUARY 2025</b>	SESSION: <b>1</b>
DURATION: <b>3 HOURS</b>	MARKS: <b>100</b>

**SUPPLEMENTARY/SECOND OPPORTUNITY: EXAMINATION QUESTION PAPER**

**EXAMINER:** *Mr Tjaronda Karumendu, Mr Festus Shafodino*

**MODERATOR:** *Prof. James Abah*

**INSTRUCTIONS**

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

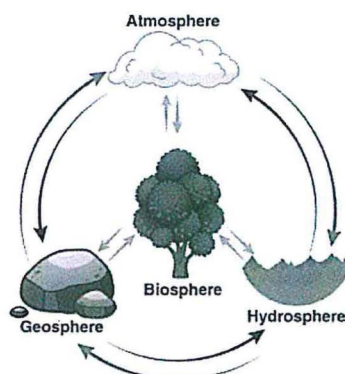
**PERMISSIBLE MATERIALS**

1. Non-Programmable Calculator

This paper consists of **3** pages including this front page and Periodic table.

**Question 1****[25]**

- 1.1. The figure below illustrates how energy and matter are exchanged between the different spheres.



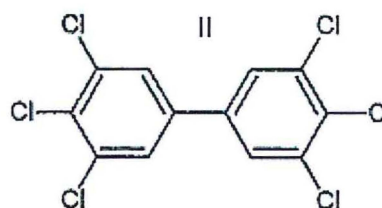
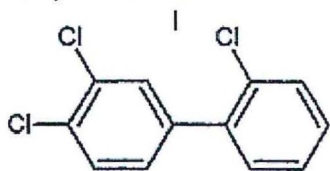
Using the Sulfur geochemical cycle, give one example showing the interaction between each sphere.

(12)

- 1.2. Describe two **major** factors that may contribute to global environmental degradation. (2)
- 1.3. Briefly explain what Green Chemistry is and how important it is for both industry and our ecosystem. (5)
- 1.4. What is the name given to elements that are distributed at higher concentrations in localized areas when their extraction and refining are economically feasible and discuss two general processes that result in these localized excesses. (6)

**Question 2****[25]**

- 2.1. Explain ozone depletion and formation of ozone holes in the Antarctica regions. (10)
- 2.2. Describe how and where (tropic level) nitric oxide is responsible for the formation of ozone. Show reactions and the sources of all reactants involved. (4)
- 2.3. Which of the following compounds I or II, 1) is more likely to be transported further in the atmosphere, 2) is more persistence in organism, and 3) is more toxic. Explain each of your choices. (6)



- 2.4. What is air pollution and provide the **four (4)** bases on which air pollutants are classified on. (5)

**Question 3****[23]**

- 3.1. State two (2) of the reasons that account for the variations in the amount of dissolved oxygen in water bodies. (2)
- 3.2. Water is one of the scarcest commodities in many communities and this is often exacerbated by the increasing rate of water pollution. State four (4) effects of complexation in water? (4)
- 3.3. Name three markers of water pollution and their corresponding sources of pollution. (3)
- 3.4. State four (4) chemical properties of acid mine drainage? (4)
- 3.5. Define the term eutrophication and propose a way how it can be controlled. (3)
- 3.6. What is BOD, and what does it stand for? (3)
- 3.7. Describe ways in which measures taken to alleviate water supply and flooding problems might actually aggravate such problems. (4)

**Question 4****[22]**

- 4.1. Discuss the composition of the soil. (5)
- 4.2. Discuss how the following factors can contribute to soil formation. (2)
  - a. Climate (2)
  - b. Living organisms (2)
- 4.3. Soil continues to develop until layers called horizons form. With the aid of a well labelled diagram, discuss the several types of soil horizons. (8)
- 4.4. Many fish are found floating dead in a lake rich in phytoplankton, despite no evidence of toxic dumping. State the phenomenon being implied and suggest three possible reasons for the fish kill. (5)

**Question 5****[5]**

In a small agricultural town, crops have been mysteriously failing for the past few seasons. The leaves are turning yellow, and the yields are significantly lower than in previous years. Local farmers have noticed an unusual, oily residue on the surface of their soil, which seems to be spreading across the fields. Tests reveal that the soil has high levels of heavy metals, particularly lead and cadmium, likely due to runoff from a nearby industrial site. The pollution has not only affected the crops but also seeped into the groundwater, posing a threat to the health of the community.

Based on the given scenario, what measures would you propose to mitigate contamination of soil and/or groundwater by heavy metals? (5)

\*\*\*\*\* END OF QUESTION PAPER \*\*\*\*\*