



NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

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QUALIFICATION : BACHELOR of SCIENCE	
QUALIFICATION CODE: 07BOSC	LEVEL: 7
COURSE: ENVIRONMENTAL CHEMISTRY	COURSE CODE: ENC702S
DATE: JANUARY 2024	SESSION: 1
DURATION: 3 HOURS	MARKS: 100

SECOND OPPORTUNITY / SUPPLEMENTARY: EXAMINATION QUESTION PAPER

EXAMINER: *Dr. Mpingana N. Akawa*

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 4 pages including this front page

QUESTION 1**[20]**

- a) Use the biogeochemical cycle of sulphur to illustrate the definition of environmental chemistry. (10)
- b) Carbon dioxide is one of the greenhouse gases which is largely responsible for global warming.
- Explain how carbon dioxide contributes to global warming. (2)
 - Discuss 4 impacts of global warming on the ecosystem. (4)
 - Suggest adaptation approaches to the global warming problem. (4)

QUESTION 2**[20]**

- a) With the aid of chemical reactions, explain how acid mine drainage (AMD) is formed. (10)
- b) Discuss the ecological impact of acid mine drainage. (5)
- c) Explain how AMD can be prevented. (5)

QUESTION 3**[20]**

- a) Briefly describe the main categories of atmospheric chemical reactions. (6)
- b) What is stratospheric ozone depletion? (2)
- c) Describe, with appropriate reactions, how the depletion in (a) occurs using chlorofluorocarbon (CFC) as a starting point. (4)
- d) Differentiate between the following terms:
- Primary and secondary pollutants (2)
 - Direct and Indirect sources (2)
 - Point and Area sources (2)
 - Classical smog and photochemical smog (2)

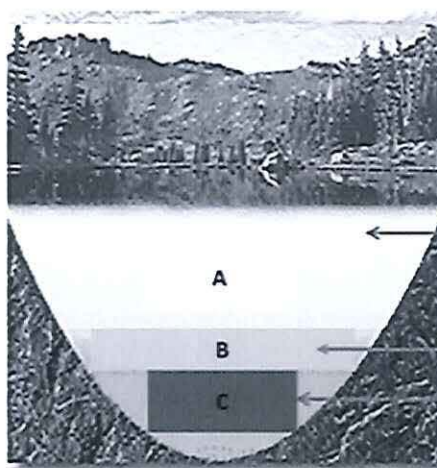
QUESTION 4**[20]**

- a) Discuss the ecological effect of the following and explain how to mitigate. (15)
- Eutrophication
 - Acid rain
 - Pesticides
 - Photochemical smog
 - Acid mine drainage

- b) Define soil erosion and name its different types. (5)

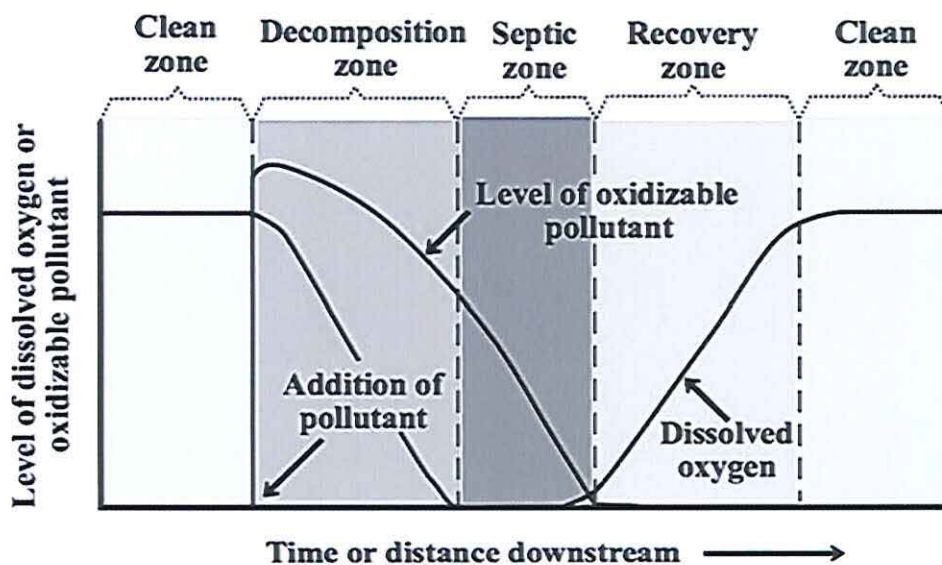
QUESTION 5 [20]

- a) The diagram below shows the thermal water stratification of a lake in summer.



Describe the layers represented in A, B and C and provide their respective key characteristics in terms of water temperature, dissolved oxygen & its effect on plants and chemical species. (8)

- b) Considering the following Oxygen sag curve resulting from the addition of oxidizable pollutant to a stream:



Discuss the five zones observed in the diagram. (5)

- c) Write down the two main reactions associated with the formation of acid rain and explain the ecotoxicological effects of acid rain. (5)
- d) Differentiate between Total Alkalinity and Phenolphthalein Alkalinity. (2)

END OF QUESTION PAPER