



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF ENVIRONMENTAL SCIENCES

DEPARTMENT OF ENVIRONMENTAL SCIENCE

**BACHELOR OF SCIENCE HONOURS DEGREE IN ENVIRONMENTAL SCIENCE AND
HEALTH**

INTRODUCTION TO FRESHWATER ENVIRONMENT

ESH 1208

Final Examination Paper

October 2024

This examination paper consists of 3 printed pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements: None

Examiner's Name: Dr M. Ndabambi

INSTRUCTIONS

1. Answer any **FOUR** questions
2. Each question carries 25 marks

MARK ALLOCATION

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5.	25
6.	25
TOTAL	100

1.

- a) Explain the role of hydrogen bonding in determining the physical state of water at different temperatures. [6]
- b) Describe how the density of water changes with temperature, and the ecological implications of this property in aquatic environments. [6]
- c) Describe how the solvent properties of water contribute to nutrient cycling and geologic weathering. [7]
- d) Explain the significance of the high heat capacity of water in aquatic ecosystems, particularly in terms of thermo-regulation and organism adaptation. [6]

2.

- a) Explain the role of the hydrologic cycle in shaping freshwater habitats. [6]
- b) Describe the impact of human activities on the hydrology of freshwater systems. [6]
- c) Describe the effects of climate change on wetland habitats and their hydrology. [6]
- d) Discuss the ecological importance of the hyporheic zone in freshwater habitats. [7]

3.

- a) Describe the basic measures of biodiversity and explain how they are used to assess freshwater ecosystems. [6]
- b) Describe the role of geographic isolation in the evolution of freshwater species. [6]
- c) Discuss the effects of climate change on the distribution and diversity of freshwater species. [13]

4.

- a) Describe the factors affecting dissolved oxygen levels in aquatic ecosystems and their ecological implications. [6]
- b) Discuss the role of photosynthesis and respiration in the metabolic balance of aquatic ecosystems. [10]
- c) Discuss the impact of human activities on the chemical composition and nutrient cycling in freshwater systems. [9]

5.

- a) Define trophic state and describe the different classifications used to assess the productivity of aquatic ecosystems. [8]
- b) Explain the process of cultural eutrophication and its primary causes. [7]
- c) Discuss the ecological impacts of eutrophication on aquatic ecosystems. [10]

6.

- a) Describe the role of detritivory in aquatic food webs and the factors influencing the nutritional quality of detritus. [6]
- b) Discuss the concept of omnivory in aquatic ecosystems and its implications for food web stability. [10]
- c) Evaluate the importance of mutualism and facilitation in freshwater ecosystems, providing examples. [9]