UNIVERSITY OF RUHUNA

FACULTY OF FISHERIES AND MARINE SCIENCES & TECHNOLOGY

Academic Year 2022/2023

Bachelor of Science Honours in Fisheries and Marine Sciences Degree/
Bachelor of Science Honours in Marine and Freshwater Sciences Degree

Level II Semester II Examination - April/May 2024

OCG 2233: Chemical Oceanography - Theory **Time: 2 hours**

Section II

Answer only Three (3) questions. **1 hour and 30 minutes/ 75 marks**

1.

a. Describe with examples bio-limiting elements, bio-intermediary elements, and non-biolimiting elements. (15 marks)

b. Briefly explain how aeolian dust from the Sahara Desert affects the marine productivity in the North Atlantic Ocean. (10 marks)

2.

a. Explain why North Atlantic Deep Water (NADW) forms at northern high latitude regions carries a higher anthropogenic CO_2 content into the deeper ocean. (13 marks)

b. Explain why Antarctic Bottom Water (AABW) forms at the Southern Ocean has low anthropogenic CO_2 content. (12 marks)

3. With labelled diagrams, explain the marine carbonate system in the ocean discussing biogeochemical processes involve in the surface to bottom carbon transportation in the ocean. (25 marks)

4.

a. Using labeled diagrams, briefly explain why the formation of oxygen minimum zones are highly associated with the productive Eastern Boundary Upwelling Systems. (10 marks)

b. Using labeled diagrams, explain the cycling of nitrogen in oceanic oxygen minimum zones. (15 marks)

5. Write short notes on any **05 (five)** of the following. (5 marks x 5: 25 marks)

a. Electrostriction feature in seawater

b. T-S diagrams and their applications

c. Sea ice as a nutrient source

d. The relationship of Revelle factor and CO_2 uptake capacity of ocean

e. Carbon exchange processes and pathways in the ocean

f. ^{16}O and ^{18}O isotope variability in the ocean and ice during glacial and non-glacial period