



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES

SCHOOL OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGY, CHEMISTRY AND PHYSICS

QUALIFICATION: BACHELOR OF SCIENCE	
QUALIFICATION CODE: 07BOSC	LEVEL: 7
COURSE CODE: MAB701S	COURSE NAME: MARINE BIOLOGY 3A
SESSION: JULY 2023	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

SUPPLEMENTARY / SECOND OPPORTUNITY EXAMINATION PAPER	
EXAMINER (S):	Dr. Edosa Omoregie
MODERATOR:	Dr. Johannes Iitembu

INSTRUCTIONS
<ol style="list-style-type: none">1. Answer all questions in Sections A, B and C2. Write clearly and neatly.3. Number your answers correctly.

PERMISSIBLE MATERIALS

Calculator

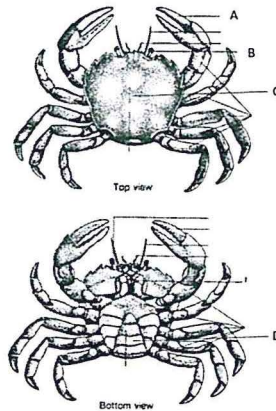
THIS QUESTION PAPER CONSISTS OF 4 PAGES
(Including this front page)

SECTION A

Answer all questions

Total marks [15]

1. The diagrams below show ventral and dorsal views of a marine invertebrate collected from the intertidal zone of the Namibian coast.



- i. Name the parts labelled as A, B, C and D. (2)
 - ii. What is the common name of this invertebrate? (2)
 - iii. What Phylum does this invertebrate belong to? (2)
 - iv. Briefly describe the structural characteristics of this marine benthos. (4)
2. Which of the following statements regarding marine productivity resulting from upwelling is true? (1)
- a. Water that rises to the surface from the bottom of the sea because of upwelling is typically colder and is rich in microalgae.
 - b. Water that rises to the surface from the bottom of the sea because of upwelling is typically colder and is rich in nutrients.
 - c. Water that rises to the surface from the bottom of the sea because of upwelling is typically warmer and is poor in microalgae.
 - d. Water that rises to the surface from the bottom of the sea because of upwelling is typically colder and is poor in nutrients.
 - e. Water that rises to the surface from the bottom of the sea because of upwelling is typically warmer and is rich in nutrients.
3. The solubility of oxygen in seawater is affected non-linearly by temperature. Is this statement true or false? (1)
- a. True
 - b. False
5. Which of the following options best describes morphological structure of the horse mackerel caudal fin? (1)
- a. Heterocercal
 - b. Truncated
 - c. Lunate
 - d. Rounded
 - e. Forked

6. Crustaceans are distinguished from other arthropods by their possession of a pair of _____ (two-parted limbs). (1)

SECTION B

Answer all questions

Total marks [40]

7. List and explain the 2 primary sources of dissolved oxygen in seawater. (6)
8. Why are nutrient cycles in the marine environment referred to as biogeochemical cycles? (4)
9. Briefly explain the main sources of nitrogen in the marine environment. (6)
10. What is denitrification? Why is this process a chemical reduction process? (4)
11. How would the ratio of Carbon to Nitrogen (C:N) affect the rate of decomposition of dissolved organic matter in the aquatic environment? (4)
12. Name any two marine dinoflagellates that produce the phytotoxin, saxitoxin. (2)
13. Briefly describe the features of marine foraminiferians. How do they differ structurally from the radiolarians? (6)
14. What are Phycocolloids? Name any two Phycocolloids and their economic importance. (4)
15. What is the main function of the choanocytes in marine sponges? (2)

SECTION C

Answer all questions

Total marks [45]

- 16 (a). With reference to the time of the day and photosynthetic activities, briefly explain the relationship between pH levels and alkalinity levels within the aquatic environment. (11)
- (b). Outline the four most common factors affecting dissolved oxygen solubility in the aquatic environment. (4)
17. (a). Briefly describe the generalized structure of the marine Echinoderm. (5)

(b). With reference to body characteristics, movement, and respiratory and digestive systems, describe the structure of marine nematodes. (10)

18. (a). Discuss the counter-current gas exchange mechanism in marine fish. (7)

(b). Using schematic diagrams, explain the differences between the opercular and buccal suction pumps during respiration in fish. (8)