



**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

13 Jackson Kaujeua Street T: +264 61 207 2012
Private Bag 13388 F: +264 61 207 9012
Windhoek E: dbc@nust.na
NAMIBIA W: www.nust.na

QUALIFICATION : BACHELOR OF SCIENCE	
QUALIFICATION CODE: 07BOSC	LEVEL: 7
COURSE: MARINE BIOLOGY 3B	COURSE CODE: MAB702S
DATE: JANUARY 2025	SESSION: 1
DURATION: 3 HOURS	MARKS: 100

SECOND OPPORTUNITY / SUPPLEMENTARY: QUESTION PAPER

EXAMINER: *Professor Edosa Omoregie*

MODERATOR: *Professor Johannes Iitembu*

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

ATTACHMENTS

None

This question paper consists of 7 pages including this front page

SECTION A: MULTIPLE CHOICE**[20 MARKS]****QUESTION 1: MULTIPLE CHOICE QUESTIONS****[20 MARKS]**

Evaluate the statements in each numbered section and select the most appropriate answer from the given possibilities. Fill in the appropriate letter next to the number of the correct statement/phrase on your ANSWER SHEET. [20]

- 1.1. Which of the following is a true description of the intertidal zones?
- a) The zone between the highest high tide level and the lowest high tide level
 - b) The zone between the lowest high tide level and the highest low tide level
 - c) The zone between the lowest high tide level and the lowest low tide level
 - d) The zone between the highest high tide level and the lowest low tide level
 - e) The zone between the highest level of the splash zone and the lowest high tide level.
- 1.2. A great white shark will be part of which of the following marine lifestyle?
- a) Plankton
 - b) Epifauna
 - c) Benthos
 - d) Nekton
 - e) Infauna
- 1.3. The filamentous locomotory structures of the dinoflagellates are referred to as?
- a) Cilia
 - b) Antennae
 - c) Pleopods
 - d) Flagella
 - e) Pseudopodia
- 1.4. Which of the following is a primary focus of Biological Oceanography?
- a) The formation of ocean currents
 - b) The study of marine sediments
 - c) The distribution and abundance of marine species
 - d) The chemical composition of the ocean
 - e) The study of tides and wave patterns
- 1.5. Which of the following describes the photic zone?
- a) The area where no light penetrates
 - b) A zone located exclusively in freshwater lakes
 - c) The area of the ocean where sunlight penetrates, allowing photosynthesis to occur
 - d) The deepest part of the ocean where only specialized organisms exist
 - e) The zone located on the continental slope
- 1.6. What is the primary difference between homeotherms and poikilotherms?
- a) Homeotherms cannot regulate body temperature, while poikilotherms can

- b) Homeotherms maintain a constant body temperature, while poikilotherms' temperature varies with the environment
- c) Poikilotherms generate heat through muscle activity, while homeotherms do not
- d) Homeotherms rely on external heat sources for temperature regulation
- e) Poikilotherms can survive only in tropical waters

1.7. Which environmental factor plays the greatest role in determining the vertical distribution of marine organisms in the open ocean?

- a) Salinity
- b) Light availability
- c) Water pressure
- d) Temperature fluctuations
- e) Sediment concentration

1.8. Which of the following is a characteristic feeding mechanism of suspension-feeding benthic organisms?

- a) Suspension feeders use specialized gill structures to pump water
- b) Suspension feeders use muscular contractions to break down sediment particles
- c) Suspension feeders capture food by releasing digestive enzymes into the water
- d) Suspension feeders burrow deep into sediments to reach nutrients
- e) Suspension feeders filter planktonic food from the water column

1.9. How does wave action influence the distribution of organisms in rocky intertidal zones?

- a) It causes the complete destruction of all sessile organisms
- b) It creates specialized niches for organisms with strong attachment structures
- c) It results in a lack of biodiversity by eliminating all weak organisms
- d) It prevents nutrient exchange between tidal pools
- e) It causes no significant impact on species distribution in the intertidal zone

1.10. Which factor is most responsible for succession in intertidal communities?

- a) Availability of space following disturbance
- b) Competition for oxygen between species
- c) Tidal mixing of nutrients
- d) Changes in water salinity
- e) Decrease in temperature at low tide

1.11. How do organisms in estuarine environments cope with varying salinity levels?

- a) By migrating to the open ocean
- b) By completely avoiding freshwater inputs
- c) Through osmoregulation and osmoconformation
- d) By changing their reproductive cycles

e) By developing resistance to desiccation

1.12. What is one of the significant ecological functions of estuaries?

- a) Acting as major carbon dioxide sinks
- b) Serving as breeding grounds for terrestrial organisms
- c) Providing critical nursery habitats for many fish species
- d) Generating oxygen for deep-sea environments
- e) Eliminating invasive species through tidal mixing

1.13. The starfish belong to which group of the following animals?

- a) Molluscs
- b) Foraminifera
- c) Brachiopods
- d) Ctenophores
- e) Echinoderms

1.14. To which of the following kingdoms do the Barnacles belong?

- a) Fungi
- b) Metazoa
- c) Monera
- d) Protista
- e) Metaphyta

1.15. What is the most critical consequence of overfishing in marine ecosystems?

- a) Increased biodiversity in fished areas.
- b) Enhanced resilience of fish stocks due to higher mortality rates.
- c) Imbalance in marine food webs, leading to the collapse of predator and prey species alike.
- d) A reduction in global temperatures due to the disruption of fisheries.
- e) The establishment of invasive species replacing the depleted stocks.

1.16. What are the primary drivers of rising sea levels, and how do they impact coastal ecosystems?

- a) Rising sea levels are driven by overfishing and have little impact on terrestrial ecosystems.
- b) Thermal expansion of ocean waters and melting ice caps contribute to sea level rise, causing coastal erosion and loss of habitat for marine and terrestrial species.
- c) Sea levels rise due to increased nutrient runoffs, benefiting coastal ecosystems by increasing food availability.
- d) Industrial pollution is the main cause of sea level rise, directly affecting marine mammals.
- e) Rising sea levels result from tectonic activity and have minimal impact on biodiversity.

1.17. How does global warming affect the distribution and migration patterns of marine fish species, and what are the consequences for global fisheries?

- a) Warmer waters accelerate fish growth, making overfishing less of a concern.
- b) Increased water temperatures cause species to migrate towards the poles, disrupting existing fisheries and leading to changes in species composition.
- c) Fish are unaffected by temperature changes because of their ability to adapt to all thermal conditions.
- d) Global warming decreases nutrient availability, reducing fish populations and improving the sustainability of fisheries.
- e) Warmer waters increase oxygen levels, expanding the habitats of most fish species.

1.18. In what ways might Marine Protected Areas (MPAs) help mitigate the effects of climate change on marine biodiversity?

- a) MPAs reduce the impacts of invasive species by promoting overfishing within their boundaries.
- b) MPAs help protect vulnerable species and ecosystems from human activities, allowing biodiversity to recover and enhancing resilience to climate change.
- c) MPAs have no impact on mitigating climate change and serve only as tourist attractions.
- d) MPAs speed up the effects of climate change by isolating marine species.
- e) MPAs only benefit coral reefs and do not affect other marine ecosystems.

1.19. How does the accumulation of plastic waste in marine ecosystems affect marine life, and what long-term implications does this pose?

- a) Plastics decompose rapidly in the ocean, having minimal impact on marine organisms.
- b) Marine animals use plastic waste to build protective shelters, improving survival rates.
- c) Plastics can entangle and poison marine organisms, disrupting ecosystems and potentially affecting the human food chain.
- d) Plastics increase water temperature, making it more favorable for certain fish species.
- e) Plastics absorb toxins from the water, cleansing the marine environment.

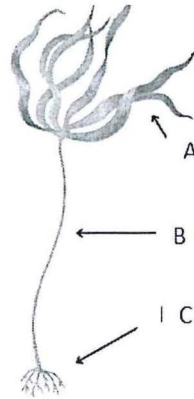
1.20. Which of the following is a primary consequence of heavy metal pollution in marine ecosystems, and why is it particularly dangerous?

- a) Heavy metals dissipate quickly, causing only temporary harm to marine organisms.
- b) Heavy metals accumulate in the tissues of marine organisms, leading to bioaccumulation and biomagnification through the food web.
- c) Heavy metals promote the growth of shell-forming organisms, increasing biodiversity.
- d) Heavy metals increase primary productivity by providing essential nutrients to phytoplankton.
- e) Heavy metals reduce water temperature, allowing cold-water species to thrive.

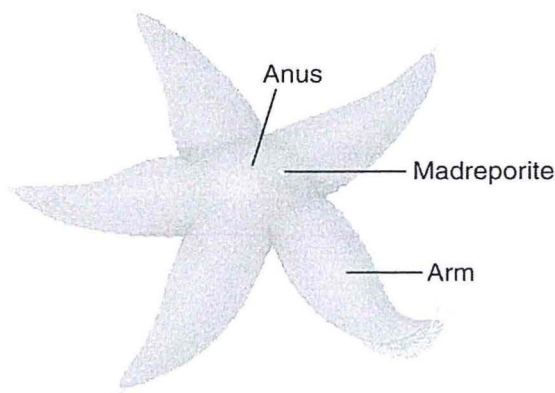
SECTION B: SHORT ANSWER QUESTIONS**[20 MARKS]****QUESTION 2: PRACTICAL SHORT ANSWER QUESTIONS**

Please answer ALL of the questions in this section.

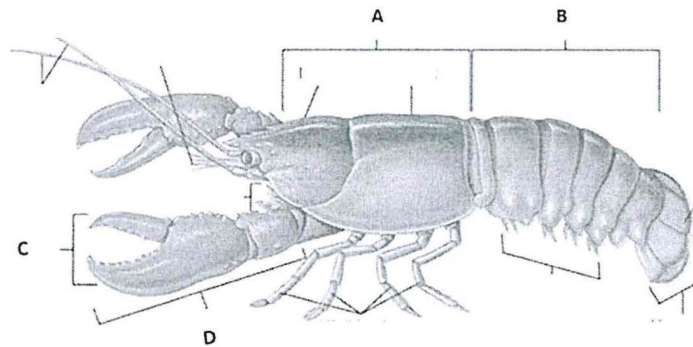
- 2.1. The diagram below illustrates the split-fan brown kelp collected during a practical exercise along the Namibia coastline.



- a. State the Genus, Class and Phylum of this macroalgae. (3)
 - b. Explain the organism's structural strategies in surviving in the intertidal zone. (3)
 - c. Name the parts labelled A, B and C (3)
- 2.2. The diagram below is an illustration of a sea star. State the Class and Phylum of the organism below. Explain the major reason for placing the organism under your stated Phylum. (7)



- 2.3. The diagram below is an illustration of a lobster. Identify the structures labelled as A, B, C and D. (4)



SECTION C: LONG ANSWER QUESTIONS

[60 MARKS]

Please answer ANY THREE of the questions in this section.

QUESTION 3

- 3.1. Using suitable examples, explain the various evolutionary strategies used by marine prey organisms to avoid predators in their environment. (7)
- 3.2. With suitable ecological examples, explain the major causes of patchiness in the distribution of marine plankton. (13)

QUESTION 4

- 4.1. With suitable labelled diagram and reference to type of marine organisms, discuss the main characteristics of the high-intertidal zone. How does this zone differ from the low-intertidal zone? (16)
- 4.2. List any four ecological roles of benthos in the marine ecosystem. (4)

QUESTION 5

- 5.1. Analyze the impact of overfishing on global fish populations and marine ecosystems. What are some strategies being implemented to promote sustainable fisheries management? (10)
- 5.2. Describe the role of aquaculture in meeting the global demand for seafood. What are the environmental benefits and potential risks associated with aquaculture? (10)

QUESTION 6

- 6.1. Discuss the impacts of global warming on the marine environment, focusing on sea-level rise, changes in ocean temperature, and ocean acidification. What are the implications for marine ecosystems and coastal communities? (15)
- 6.2. Explain the relationship between ocean acidification and the health of calcifying organisms, such as corals, mollusks, and certain plankton species. (5)

END OF QUESTION PAPER