



**PAMIBIA UNIVERSITY**  
**OF SCIENCE AND TECHNOLOGY**

**FACULTY OF HEALTH AND APPLIED SCIENCES**

**DEPARTMENT OF NATURAL AND APPLIED SCIENCES**

<b>QUALIFICATION: BACHELOR OF SCIENCE</b>	
<b>QUALIFICATION CODE: 07BOSC</b>	<b>LEVEL: 7</b>
<b>COURSE CODE: MAB701S</b>	<b>COURSE NAME: MARINE BIOLOGY 3A</b>
<b>SESSION: JULY 2019</b>	<b>PAPER: THEORY</b>
<b>DURATION: 3 HOURS</b>	<b>MARKS: 100</b>

<b>SUPPLEMENTARY / SECOND OPPORTUNITY EXAMINATION PAPER</b>	
<b>EXAMINER (S):</b>	<b>Prof. Edosa Omoregie</b>
<b>MODERATOR:</b>	<b>Dr. Johannes litembu</b>

<b>INSTRUCTIONS</b>
1. Answer all questions 2. Write clearly and neatly 3. Number your answers clearly

**PERMISSIBLE MATERIAL**

Scientific Calculator

**THIS QUESTION PAPER CONSISTS OF 3 PAGES**  
(Including this front page)

**Question 1****[20]**

- a) Show the equation of how the solubility of carbon dioxide would increase the acidity of sea water. What is the name of the acid produced? (4)
- b) With suitable examples, briefly describe the main forms in which nitrogen compounds are present in natural seawater. (4)
- c) With the aid of chemical equation only, show how primary producers convert inorganic carbon to organic carbon in the marine environment. (2)
- d) With the use of chemical equation only, show how the oxidation of Sulphur will lead to the reduction of pH in natural water bodies. (2)
- e) Briefly explain how biochemical oxygen demand is measured in the laboratory. (4)
- f) Using Henry's gas law, what will be the concentration of carbon dioxide in a water body at 2.4 atm and at 18°C? Given:  $K_H$  of  $\text{CO}_2$  in water = 29.41 mm Hg / (mol/L). (4)

**Question 2****[20]**

- a) Why are nutrient cycles in the marine environment referred to as biogeochemical cycles? (2)
- b) Why would too much phosphate in seawater lead to the production of algal bloom? (2)
- c) With the aid of suitable graphical illustration, explain vertical distribution of phosphates in a stratified productive marine environment. (6)
- d) With the aid of graphical illustrations, discuss the concept of metalimnetic oxygen maximal and metalimnetic oxygen minimal in the marine environment. (10)

**Question 3****[20]**

- a) Briefly explain the major processes by which nitrogen is lost from the marine environment. (4)
- b) With reference to time of the day and photosynthetic activities, briefly explain the relationship between the levels of pH and alkalinity within the aquatic environment. (6)
- c) With the aid of glycolytic pathway and the tricarboxylic acid cycle, explain the process of oxic decomposition in the marine environment. (10)

**Question 4****[20]**

- a) Briefly describe the features of marine foraminiferans. How do they differ structurally from the radiolarians? (4)
- b) Highlight the structural differences of marine diatoms and marine dinoflagellates. (4)
- c) With reference to structure, what are the main differences between the polyp and medusa forms of the phylum Cnidaria? (4)
- d) With the aid of schematic diagrams, briefly explain the differences between the opercular and buccal suction pumps during respiration in fish. (8)

**Question 5**

**[20]**

- a) Why are the microalgae very important in sustaining all forms of marine life? (2)
- b) List the three respective predominating pigments in the green, brown and red algae. (3)
- c) With the aid of a suitable diagram, explain the general characteristics and structure of marine macroalgae. (10)
- d) With the aid of a diagram, briefly describe the process of asexual reproduction in marine macroalgae. (5)