



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF NATURAL AND APPLIED SCIENCES

QUALIFICATION: BACHELOR OF SCIENCE	
QUALIFICATION CODE: 07BOSC	LEVEL: 7
COURSE CODE: ECO701S	COURSE NAME: ECOLOGY
SESSION: JUNE 2019	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER (S):	Prof. Edosa Omoregie
MODERATOR:	Prof. Isaac Mapaure

INSTRUCTIONS	
<ol style="list-style-type: none">1. Answer all questions2. Write clearly and neatly3. Number your answers clearly	

PERMISSIBLE MATERIAL

Scientific Calculator

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

Question 1 [20]

- a) Define the following terms in an ecological context. Each question carries 1 mark. (5)
- i. Synecology
 - ii. Biodiversity
 - iii. Abundance
 - iv. Distribution
 - v. Population
- b) Briefly explain the following terms in an ecological context. Each question carries 1 mark. (5)
- i. Population ecology
 - ii. Community ecology
 - iii. Ecosystem ecology
 - iv. Microevolution
 - v. Interspecific competition
- c) Briefly explain the concept of competitive exclusion principle in ecology. (10)

Question 2 [20]

- a) Suppose you have photo-identified 28 humpback whales around the Walvis Bay Harbour in one cruise. Two weeks later you return to the same area and photograph all the whales you encounter. On the second trip you photograph a total of 62 whales, of which 16 were photographed previously. Use the Lincoln-Peterson index to estimate the number of humpback whales around Harbour during your study. (4)
- b) Explain the assumptions of the Lincoln-Peterson index population estimation method. (6)
- c) In an ecological survey on the population of Buffalo in Erindi Game Reserve an ecologist recorded the number of surviving populations for each age group in the Table below. Compute the population of the Buffalo surviving (l_x) from start to age group 26 – 30 years, the number of Buffalo dying during each age interval (d_x) and the per capita rate of mortality for each age interval (q_x). Show the calculations for each age group. Sketch the survivorship curve for the above survey and indicate which type of curve is the Buffalo population displaying. (10)

x (years)	n_x	l_x	d_x	q_x
0 – 5	621			
6 – 10	605			
11 – 15	516			
16 – 20	451			
21 – 25	21			
26 - 30	13			

Question 3 [20]

- a) With the aid of graphic illustration, briefly explain the possible outcome of interspecific competition based on the Lotka-Volterra model. (8)

- b) In a field research to estimate the biodiversity of two different habitats, a researcher recorded the population of animals encountered in the data below.

Species	Open habitat	Bush encroached
Cape Turtle Dove	25	12
Sabota Lark	1	0
Monotonous Lark	2	7
Rufous naped lark	5	0
Ant Eating chat	6	0
Marico Flycatcher	3	12
Richards Pipit	3	0
Cape Penduline Tit	0	5
Three streaked Tchagra	0	10
Crimson Breasted Shrike	0	5
Lesser Grey Shrike	3	0
Karoo Korhaan	2	0
Damara Canary	0	5
White browed sparrow weaver	15	0

- i. Using the data calculate the Shannon index and Simpson index for the Open habitat community. (8)
- ii. Using the data, compute the Sorenson's coefficient for the two communities. (4)

Question 4

[20]

- a) With the aid of suitable equations and graphic illustrations, briefly discuss the mathematical expressions of exponential and logistic population growth. (10)
- b) With reference to species abundance, species richness and community response, discuss the general prediction of ecosystem response to disturbance intensity. (10)

Question 5

[20]

- a) Briefly explain the difference between gross primary productivity (GPP) and net primary productivity (NPP). (4)
- b) With the aid of suitable graphic illustration, explain the concept of compensation point as it relates to the flow of energy within the ecosystem. (4)
- c) Write short notes on the following:
 - i. Pyramid of Numbers (4)
 - ii. Pyramid of Biomass (4)
 - iii. Pyramid of Energy (4)