NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES

DEPARTMENT OF NATURAL RESOURCES SCIENCES

QUALIFICATION: BACHELOR of NATURAL RESOURCE MANAGEMENT (NRM)	
QUALIFICATION CODE: 07BNRS	**LEVEL:** 7
COURSE CODE: CSE511S	**COURSE NAME:** CONSERVATION ECOLOGY 1
SESSION: JUNE 2025	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 150

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
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MODERATOR:	Mr. H. Tjikurunda

INSTRUCTIONS
1. Answer ALL the questions. 2. Read all the questions carefully before answering. 3. Number the answers clearly 4. Make sure your name and surname, question number and the date appear on the answer script. 5. Please ensure that your writing is legible, neat and presentable.

THIS MARKING SCHEME CONSISTS OF 7 PAGES (Including this front page)

QUESTION 1

Write short notes to define or explain the following scientific terms:

1.1.	Ecology	(1)
1.2.	Natural selection	(1)
1.3.	Ecosystem	(1)
1.4.	Landscape ecology	(2)
1.5.	Competition	(1)
1.6.	Keystone Species	(3)
1.7.	Population	(1)
		[10]

QUESTION 2

Explain the difference between the following pairs of terms.

2.1.	Eluviation soils vs. Illuviation soils	(2)
2.2.	Fundamental vs. Realised niche	(2)
2.3.	Ecological Density vs. Crude Density	(2)
2.4.	Autotrophs vs. Heterotrophs	(2)
2.5.	Intraspecific vs. Interspecific competition	(2)
		[10]

QUESTION 3

Match definitions or examples with correct words (write the number and alphabet) (10).

Definitions or examples	**Words**
3.1. The environmental factors that support (and influence) the growth, survival and reproduction of a species.	a) Life Histories b) Mortality curves c) Intermediate Disturbance Hypothesis
3.2. Species that create, modify and maintain habitats, by shaping the habitat to their own needs, subsequently altering the availability of microhabitats, food, water, sunlight and shelter for other species, thus making other species' existence possible in a community.	d) Ecosystem engineers e) Ecological succession f) Landscape connectivity. g) Colonisation h) Keystone species
3.3. A hypothesis that predicts that local species diversity is maximised when an ecological disturbance is neither too rare nor too frequent.	i) Natural selection j) Ecological niche k) Keystone species
3.4. The sequence of events related to survival and reproduction that occur from birth through death.	l) Mortality curves m) Endemic species
3.5. A type of survivorship curve in which individuals tend to live out their physiological life span and produce few offspring but provide extensive parental care.	n) Dispersal o) Population size p) Ubiquitous species q) Evolution
3.6. A species whose geographic distribution is limited to a specific area or spatial unit (such as a country or a biome).	r) Type III s) Population density t) Type I
3.7. A process in which individual organisms or phenotypes that possess favourable traits are more likely to survive and reproduce.	

3.8. The process of change in the species structure of an ecological community over time.

3.9. The number of individuals per unit area.

3.10. The degree to which the landscape facilitates or impedes the movement of organisms among patches.

QUESTION 4

Choose the correct answer.

4.1. Which of the following spheres includes human-made environments such as cities and roads? (1)

A. Biosphere
B. Atmosphere
C. Anthroposphere
D. Hydrosphere

4.2. What is the main reason the Namib Desert remains arid? (1)

A. Lack of groundwater
B. High rainfall
C. Coastal fog
D. Coastal upwelling and dry climate

4.3. Which of the following cycles does not have a gaseous phase? (1)

A. Water cycle
B. Carbon cycle
C. Nitrogen cycle
D. Phosphorus cycle

4.4. What is the conceptual link between predation, herbivory, and parasitism? (1)

A. All involve the direct killing of the host
B. They all enhance the fitness of one organism at the expense of another
C. They all involve symbiotic relationships
D. They all result in the extinction of the prey species

4.5. What happens when two species occupy the same niche in the competitive exclusion principle? (1)

A. They share resources equally
B. One species outcompetes the other, leading to exclusion
C. Both species increase in population size
D. The competition makes both species disappear

4.6. What defines a population in ecology? (1)

A. A group of individuals of the same species in a given area
B. A group of organisms that share the same habitat
C. All species living in a defined region
D. A collection of species interacting with their environment

4.7. What is carrying capacity (K)? (1)

A. The minimum population size needed for survival
B. The number of individuals a population can have before going extinct
C. The maximum number of individuals that an environment can support

D. The rate at which a population increases

4.8. What type of factors limit population growth by increasing mortality or reducing birth rates as population density increases? (1)

A. Density-independent factors
B. Density-dependent factors
C. Abiotic factors
D. Evolutionary factors

4.9. Which of these factors is a characteristic of bottom-up control? (1)

A. Predators controlling prey populations
B. Competition among carnivores
C. Nutrient availability regulating plant and herbivore populations
D. Keystone species modifying their habitat

4.10. What is a key characteristic of pioneer species? (1)

A. Slow growth rates and long lifespans
B. High dispersal ability and rapid colonisation
C. Dependence on competition for survival
D. Specialisation to stable environments

[10]

QUESTION 5

Indicate whether the following sentences are true or false.

5.1. Intraspecific competition does not affect an individual's growth or development. (1)

5.2. Scavengers are a type of predator. (1)

5.3. Predation plays a role in natural selection by influencing the evolution of both predators and prey. (1)

5.4. A species' realised niche is always smaller than its fundamental niche due to competition and other biotic factors. (1)

5.5. Generalist species have narrow niches and are highly sensitive to environmental changes. (1)

5.6. Sex ratio can influence population growth because fewer females result in slower growth. (1)

5.7. The logistic growth model describes a population growing exponentially forever. (1)

5.8. Predators in an ecosystem always cause population collapse in prey species. (1)

5.9. Anthropogenic disturbances tend to have more severe and long-term effects on biodiversity than natural disturbances. (1)

5.10. Pioneer species play a key role in primary succession by improving soil conditions. (1)

[10]

QUESTION 6 (Units 2: The environment)

6.2. Explain how the biosphere is connected to the other spheres. (3)

6.3. Discuss the four main Earth system spheres and describe how they interact using the example of a tree growing in Namibia. (8)

[11]

QUESTION 7 (Unit 3: Species)

7.1. Prey species have evolved a wide range of characteristics to avoid being detected, selected, and captured by predators. List three (3) morphological defence mechanisms adopted by animals to avoid being captured. (3)

7.2. List the three (3) forms of exploitative interactions. (3)

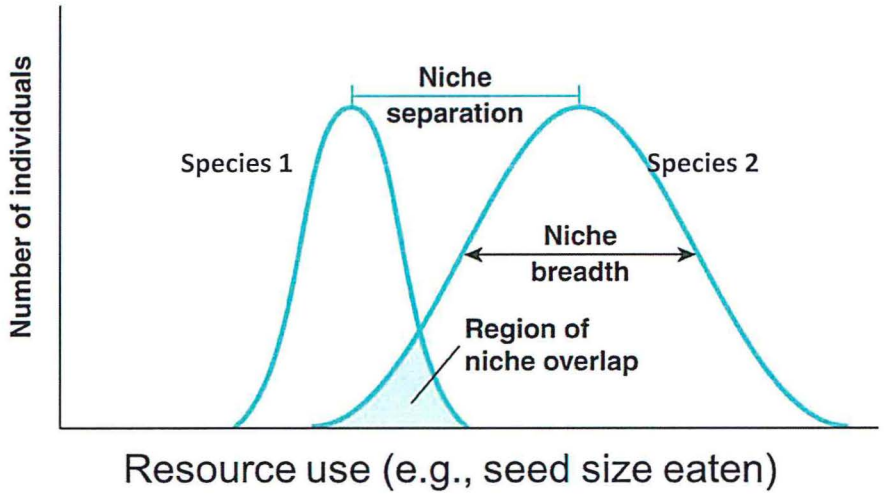
7.3. Study the graph below and describe the two species in terms of: (6)

(a) Niche width (2)

(b) The extent of niche overlap (1)

(c) Degree of competition (1)

(d) Generalist species vs. specialist species (2)



[12]

QUESTION 8 (Unit 4: Populations)

8.1. What are survivorship curves, and why are they important? (5)

8.2. Describe two ways in which high population density can affect animal reproduction. (2)

8.3. What is self-thinning in plant populations, and why does it occur? (2)

[9]

QUESTION 9 (Unit 5: Communities)

9.1. Almost all levels of organisation in ecology share a set of properties. List those properties. (3)

9.2. Ecologists often use the Intermediate Disturbance Hypothesis (IDH) to explain the size of different communities. Briefly explain what this hypothesis hypothesises. (5)

9.3. Name the two attributes used by ecologists to measure species diversity. (2)

9.4. Using the game count numbers of Khaudum National Park, provided in the table below, answer the questions below. (13)

Species	Abundance
Elephant	250
Roan	123
Oryx	105
Ostrich	90
Kudu	98
Warthog	0
Blue wildebeest	102
Red hartebeest	0
Tsessebe	0
Steenbok	25
Duiker	32

9.4.1 What is the richness of the species of Khaudum National Park? (1)

9.4.2 Using the Shannon-Wiener index (H), calculate the diversity of Khaudum National Park, using three decimal places after the comma. (12)

9.4.2 Construct/Draw a Rank-Abundance Graph, also known as a Whittaker Plot, using the dataset provided above. (5)

[28]

QUESTION 10 (Unit 6: Ecosystems)

10.1. ***List*** and ***explain*** three limiting factors for primary production in a terrestrial ecosystem. Focus only on bottom-up controls of primary production. (6)

10.2. ***Discuss*** the process of nutrient cycling within a terrestrial ecosystem. In your explanation, use the essential element nitrogen as an example. (9)

[15]

QUESTION 11 (Unit 7: Landscapes)

11.1. Landscape ecology differs from other areas of ecological study we have dealt with thus far. Explain how landscape ecology differs from other branches of ecology. (2)

11.2. The spatial structure of each landscape is unique and results from the interactions of a variety of factors, including abiotic (physical), biotic, natural disturbances, and human activities. Discuss how each of these factors contributes to shaping the spatial structure of a landscape. In your answer, provide examples of how these elements interact to influence landscape patterns and processes. (8)

11.3. Boundaries within landscapes, particularly narrow and abrupt edges, can significantly influence species interactions. Explain how habitat boundaries affect predator-prey dynamics and species dispersal across landscapes. (4)

11.4. Why are Ecologists interested in the shape of the patch? (2)

11.5. Dispersal among habitat patches is critical in population dynamics and metapopulation structure. Describe the three levels of dispersal among patches, and explain how each level influences population connectivity and persistence. (3)

[19]

QUESTION 12 (Unit 8: Global ecology)

12.1. Explain the key principles of the Theory of Island Biogeography and discuss its relevance to natural resource management. (2)

12.2. The Millennium Ecosystem Assessment (MEA) presented key findings on the state and trends of global biodiversity. Summarise the main findings of the Millennium Ecosystem Assessment regarding biodiversity. (4)

[6]

TOTAL: 150 marks