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<b>QUALIFICATION: BACHELOR OF NATURAL RESOURCES MANAGEMENT</b>	
<b>QUALIFICATION CODE: 07BNRS</b>	<b>LEVEL: 7</b>
<b>COURSE: CONSERVATION ECOLOGY 1</b>	<b>COURSE CODE: CSE511S</b>
<b>DATE: JUNE 2024</b>	<b>SESSION: 1</b>
<b>DURATION: 3 HOURS</b>	<b>MARKS: 150</b>

<b>FIRST OPPORTUNITY: QUESTION PAPER EXAMINATION</b>	
<b>EXAMINER(S)</b>	Mr Jeremia K.L Amutenya and Prof. Theo Wassenaar
<b>MODERATOR:</b>	Mr Helmuth Tjikurunda

#### **INSTRUCTIONS**

1. Please write neatly and legibly.
2. Do not use the left-side margin of the exam paper.
3. No books, notes or other additional aids are allowed.
4. Mark all answers clearly with their respective question numbers.

#### **PERMISSIBLE MATERIALS**

1. None

#### **ATTACHMENTS**

1. None

**This paper consists of 6 pages including the front page**

### **QUESTION 1**

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

- 1.1. Ecology (1)
  - 1.2. Population (1)
  - 1.3. Carrying capacity (1)
  - 1.4. Trophic cascade (2)
  - 1.5. Ecological disturbance (1)
  - 1.6. Nutrient cycling (1)
  - 1.7. Landscape Ecology (2)
  - 1.8. Ecotone (1)
- [10]**

### **QUESTION 2**

**Explain the difference between the following pairs of terms.**

- 2.1. Fundamental niche vs. Realised niche (2)
  - 2.2. Crude density vs. ecological density (2)
  - 2.3. Autogenic Ecosystem Engineer vs. Allogenic Ecosystem Engineer (2)
  - 2.4. Habitat resistance vs. Habitat resilience (2)
  - 2.5. Gross Primary Production (GPP) vs. Net Primary Production (NPP). (2)
- [10]**

### **QUESTION 3**

Match definitions or examples with correct words (just write the number and alphabet e.g. 1c).

#### **Definitions or examples**

1. The environmental factors that support (and influence) the growth, survival and reproduction of a species.
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.
3. A hypothesis that predicts that local species diversity is maximized when an ecological disturbance is neither too rare nor too frequent.
4. The sequence of events related to survival and reproduction that occur from birth through death.
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.
6. A species whose geographic distribution is limited to a specific area or spatial unit (such as a country

#### **Words**

- a) Life Histories
- b) Mortality curves
- c) Intermediate Disturbance Hypothesis
- d) Ecosystem engineers
- e) Ecological succession
- f) Landscape connectivity
- g) Colonization
- h) Keystone species
- i) Natural selection
- j) Ecological niche
- k) Keystone species
- l) Mortality curves
- m) Endemic species
- n) Dispersal
- o) Population size
- p) Ubiquitous species
- q) Evolution
- r) Type III
- s) Population density

or a biome).

t) Type I

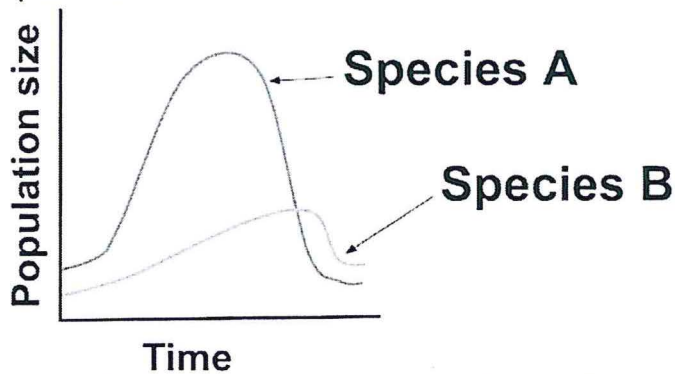
7. A process in which individual organisms or phenotypes that possess favourable traits are more likely to survive and reproduce.
8. The process of change in the species structure of an ecological community over time.
9. The number of individuals per unit area.
10. The degree to which the landscape facilitates or impedes the movement of organisms among patches.

#### **QUESTION 4**

Multiple choice questions, select only the correct answers.

- 4.1. Which of the examples below can best be described as interspecific competition? (1)
  - a) Tilapia in the Zambezi River competing for food.
  - b) Trees in the woodland savanna compete for light.
  - c) Male Elephants in Khaudum National Park compete for mates.
  - d) Lions compete for food in Etosha National Park.
- 4.2. Lichens are made of fungi and algae and benefit from growing together. Which of the following words describes this relationship? (1)
  - a) Commensalism
  - b) Amensalism
  - c) Mutualism
  - d) Neutralism
- 4.3. An example of a population is \_\_\_\_\_ (1)
  - a) All shrubs in Waterberg Park
  - b) All *Vachellia erioloba* trees in the Namib Desert
  - c) All animals in Khaudum National Park
  - d) A mixture of black and white rhinos in Etosha National Park
- 4.4. The carrying capacity of an environment for a species at a particular time is determined by \_\_\_\_\_ (1)
  - a) Number of individuals in the species
  - b) Reproductive potential of the species
  - c) Distribution of the population
  - d) Supply of the most limited resources
- 4.5. Logistic growth is representative of a population in an environment with \_\_\_\_\_ resources. (1)
  - a) Limited
  - b) Plenty
  - c) Constant
  - d) All the above
- 4.6. The carrying capacity of an environment for a species at a particular time is determined by \_\_\_\_\_ (1)
  - a) Number of individuals in the species
  - b) Reproductive potential of the species

- c) Distribution of the population
  - d) Supply of the most limited resources
- 4.7. Which of the following characteristics is **NOT** used to measure community structure? (1)
- a) Species Diversity
  - b) Multi-dimensional measures
  - c) Physical Diversity
  - d) Community composition list
- 4.8. Which sentence below describes composition? (1)
- a) This is the list of species, including their names, that occur in a particular community.
  - b) The proportion (or percentage) of the total number of individuals in the community that belong to a particular species.
  - c) The equitability in the distribution of individuals among the species.
  - d) The set of species present and their relative abundances.
- 4.9. Food webs are models that shows .....? (1)
- a) One sequence of producers and consumers.
  - b) Stored energy in food chains
  - c) Complex networks of feeding relationships.
  - d) Only primary consumers in an ecosystem
- 4.10. Which statement describes the most likely relationship between Species A and Species B? (1)



- a) Species A is a consumer and Species B is its producer.
- b) Species A competes with Species B.
- c) Species A has a mutualistic relationship with Species B.
- d) Species A is the prey of Species B.

[10]

### QUESTION 5

Indicate whether the below questions are **True or False**.

- 5.1. Almost all atmospheric vapour is contained in the Troposphere. (1)
- 5.2. Temperature differences arise due to radiation from the sun falling unevenly across the hemispheres of the earth because the earth is tilted on its axis relative to its orbital plane. (1)
- 5.3. Pressure differences arise because of temperature differences. (1)
- 5.4. The exponential growth model is a prime example of a population model that is experienced in a Savanna ecosystem. (1)
- 5.5. Competition is a prime example of a density-independent factor. (1)
- 5.6. Greater species richness is reflected by the length of the rank-abundance curve of a community – the shorter it is, the richer it is in species. (1)
- 5.7. R.H. Whittaker was the first person to utilize the Rank-abundance plot, hence it is referred to as the Whittaker Plot. (1)
- 5.8. Populations of many species do not occur as a single continuously distributed population but in spatially isolated patches with an exchange of individuals among the patches. (1)
- 5.9. An unsuitable matrix can hinder the recolonization of a patch and the population may fail to locate another suitable habitat patch to settle in. (1)
- 5.10. The study of metapopulation dynamics is essentially the study of the conditions under which these two processes are in balance. (1)

[10]

### QUESTION 6

- 6.1. **Explain** why we refer to the earth as a “system”. (2)
- 6.2. **Discuss one** factor that affects Namibia’s climate. (2)
- 6.3. **List five** spheres that make up the Earth system. (5)

[9]

### QUESTION 7

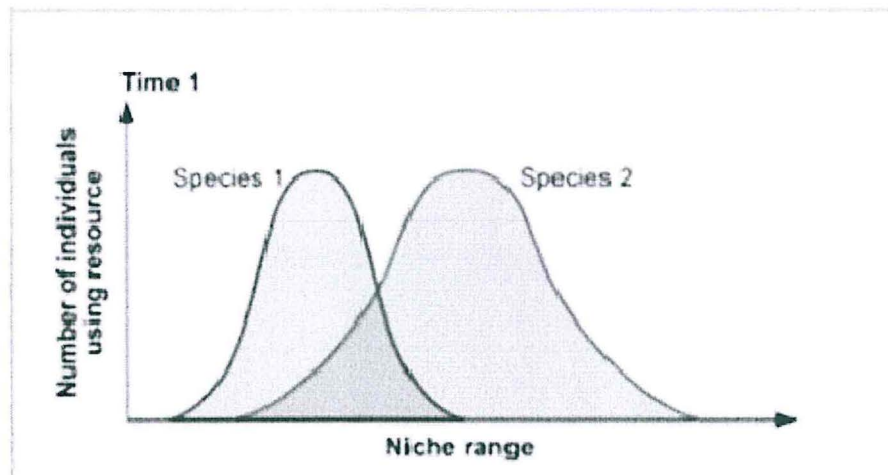
- 7.1. **Discuss** the three possible outcomes of interspecific competition by using **relevant ecological terms and examples**. (6)
- 7.2. The term ecological niche has three distinct meanings among scientists, each with an associated conceptual basis. **Name** and **explain** these three distinct meanings and indicate which of the three is the most common in nature. (7)

[13]

### QUESTION 8

- 8.1. Population dynamics of any species is concerned with the factors that influence the expansion, decline, and maintenance of populations. **Name** the four primary factors that drive population dynamics in nature. (4)
- 8.2. **What** are survivorship curves and **why** are they important? (5)
- 8.3. **List** the two types of population growth curves you have been introduced to in class and indicate which of the two is more realistic (in nature) and why. (4)
- 8.4. Study the graph below and **describe** the two species in terms of: (6)

- (a) Niche width
- (b) The extent of niche overlap
- (c) Degree of competition
- (d) Generalist species vs. specialist species
- (e) The potential of becoming extinct if environmental conditions change



[19]

#### QUESTION 9

- 9.1. You have been appointed as the Warden for Khaudum National Park, which **ecological measurement** would you use to measure **species diversity** in the park? (2)
- 9.2. **Name two** common tools used to examine and present the patterns (abundance) of a community. (2)
- 9.3. You have been introduced to two indices that are used to measure species diversity in a community namely; **Simpson's Diversity (D)** and **Shannon-Wiener Diversity (H)**. Briefly **explain the differences** between the two indices using a table. (6)
- 9.4. Explain seven importance of species composition for Natural Resource Managers. (7)

[17]

#### QUESTION 10

- 10.1. **Place/Rank** the following Namibian ecosystems (the Namib Desert, Woodland Savanna in the Zambezi Region north-eastern part of Namibia and the Highland Savanna central Namibia, including Windhoek) from the highest to lowest (1 – 3) Primary productivity and **provide** the reasons for your ranking (motivate). In other words, which ecosystem is expected to have the highest, moderate, and lowest primary productivity and **why**? (6)
- 10.2. Ecologists are mainly interested in the Net Primary Production (NPP) of an ecosystem. Explain the reasons **why**. (4)
- 10.3. Not all organic matter decomposes at the same rate. **Discuss** this statement. (5)
- 10.4. **Explain five (5)** important factors as to why ecologists study food chains and food webs in an ecosystem. (5)

[20]

**QUESTION 11**

- 11.1. **How** is landscape ecology different from other areas of ecological studies that were discussed in class? (2)
- 11.2. The structure of a landscape consists of four main elements. **Name and explain** these elements. (8)
- 11.3. **How** does metapopulation dynamics differ from normal population dynamics? (4)
- [14]

**QUESTION 12**

- 12.1. **Define** the theory of island biogeography. (2)
- 12.2. **Name five** ways in which climate change has already affected biodiversity. (6)
- [8]

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END OF QUESTION PAPER