NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGY, CHEMISTRY AND PHYSICS

QUALIFICATION : BACHELOR OF SCIENCE	
QUALIFICATION CODE: 07OBSC	**LEVEL:** 7
COURSE: ECOLOGY	**COURSE CODE:** ECO701S
DATE: JULY 2023	SESSION: 2nd OPPORTUNITY
DURATION: 3 HOURS	**MARKS:** 100

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER (S)	**Dr Norman Muzhinji**
MODERATOR	**Prof Isaac Mapaure**

THIS EXAMINATION PAPER CONSISTS OF SEVEN (7) PAGES
(INCLUDING THIS FRONT PAGE)

INSTRUCTIONS

1. All examination **RULES** apply
2. Answer **ALL** questions
3. Read all the questions carefully before answering
4. Marks are indicated at the end of each question
5. Write clearly and neatly.
6. All written work **MUST** be done in **BLUE** or **BLACK** ink.

Section A: Multiple choice questions (10 marks)

1. In a logistic growth curve, exponential growth is the phase in which the population
   A. Reaches carrying capacity.
   B. Grows quickly.
   C. Growth begins to slow down.
   D. Growth stops.

2. Ideally, sustainable development should
   A. Put the protection of the environment ahead of human needs.
   B. Provide for human needs at the expense of the environment.
   C. Use more natural resources to make goods to meet human needs.
   D. Preserve ecosystems while providing for human needs.

3. A species that exerts a strong control on community structure by having the highest abundance or biomass in a community is a,
   A. Keystone
   B. Dominant
   C. Predator
   D. Mutualistic

4. One of the impacts associated with the current increase in CO_2 in the atmosphere is
   A. An increase in the greenhouse effect leading to higher average global temperatures.
   B. A higher proportion of skin cancers and cataracts in humans.
   C. An increase in nutrient concentration across terrestrial water systems.
   D. A decrease in global temperatures

5. The total amount of living tissue within a given trophic level is called the
   A. Organic mass.
   B. Trophic mass.
   C. Energy mass.
   D. Biomass

6. Only 10 percent of the energy stored in an organism can be passed on to the next trophic level. Of the remaining energy, some is used for the organism's life processes, and the rest is,
   A. Used in reproduction.
   B. Stored as body tissue.
   C. Stored as fat.
   D. Eliminated as heat

7. Excessive nitrate levels are often found in the groundwater of areas with intensive agriculture.
   Which is an agricultural practice that can cause such levels?

   A. Improper construction or maintenance of animal waste lagoons

B. Use of ammonia in disinfection of meat products
C. Application of pesticides on fields before harvesting
D. Planting monocultures of GMO legume plants for crops

8. In a forest community, a shelf fungus and a slug live on the side of a decaying tree trunk. The fungus digests and absorbs materials from the tree, while the slug eats algae growing on the outside of the trunk. These organisms are

   A. The same habitat, but different niches
   B. The same niche, but different habitats
   C. the same niche and the same habitat
   D. different habitats and different niches

9. In the National Botanic Garden of Namibia, there are 50 species more than the 25 species found at the Ombili Conservative Centre. In between them, they have 5 species in common. Calculate the Sorenson's coefficient.
   A. 0.067
   B. 0.13
   C. 5
   D. 3

10. Abandoned farms usually revert to forest after some time. This process of forest regeneration is called:
   A. Primary succession
   B. Biorestoration
   C. Secondary succession
   D. Climax succession

Section B: Answer all questions (90 Marks)

1. A fisheries ecologist wishes to optimize his/her yield by maintaining a population of trout at exactly 1000 individuals. Predict the initial instantaneous growth rate if the population is stocked with an additional 700 fish and K = 2000. Assume r is 0.008 individuals/(individual*day). [4]

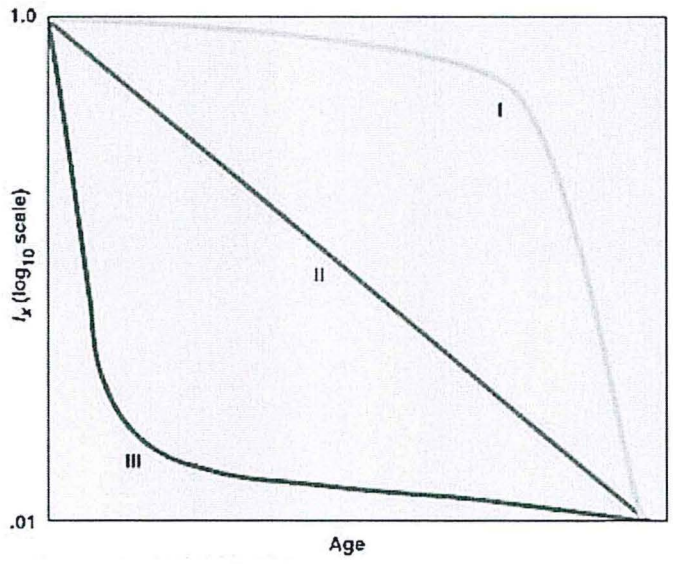
2. a. A life table is a record of survival and reproductive rates in a population. Population ecologists have found life tables useful in understanding patterns and causes of mortality, predicting the future growth or decline of populations.

   The table below shows a cohort life table of dogs in Windhoek, Namibia

Age (years) x	n_x	*lx*	*dx*	*qx*	mx	lxXmx
0	1200				0	
1	150				1.7	
2	75				8.1	
3	25				13.2	
4	0				-	

Complete the life table and predict if the population is growing or not. [5]

b. Study the survivorship curves below: Answer each question with Type I, Type II, or Type III as the answer and explain your choice.



i. Which of the survivorship curves in the graph is typically observed in some lizard species? [2]

ii. Which of the survivorship curves shows characteristic of species that exhibit r-selection strategy in production of offspring?

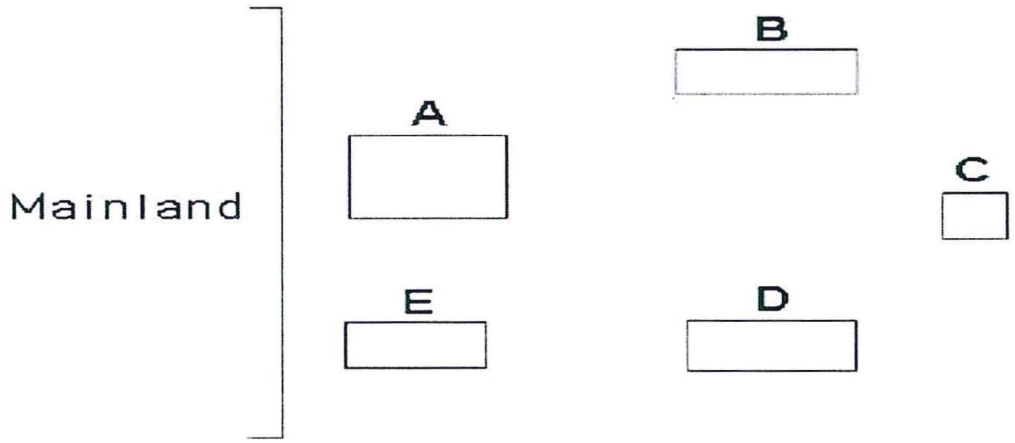
[2.

iii. Which of the survivorship curves in the graph is typically observed in some large mammalian species like elephants? [2]

3. a. Describe and explain the logistic model of population growth. [4]

b. List four (4) density-dependent factors that can cause a population's growth to slow and level out at carrying capacity. (4)

4. Explain, with examples, how interspecific competition influences species coexistence and community diversity. [3]
5. Why do alien invasive species successfully colonise and spread in new native habitats? [2]
6. The figure below shows five islands (A to E) and their distances from the mainland.



a. Rank the islands from highest number to lowest number of expected biodiversity. Justify your ranking. [3]

b. Explain why species richness is higher in the tropics and declines as we move away from the equator.

[3]

7. a. Outline the human activities that have changed the global nitrogen cycle. How do changes in the nitrogen cycle affect the carbon cycle? [4]

b. The Nitrogen cycle alone is responsible for atmospheric concentrations of greenhouse gases.

c. With the aid of a diagram describe the Nitrogen cycle [4]

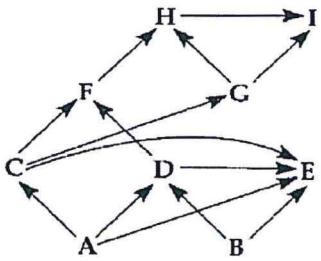
d. State at least four (4) human activities that interferes with the Nitrogen cycle. [4]

8. Suggest three measures that can be implemented to manage loss of biodiversity in a community with resources managed under "Tragedy of the Commons". [3]
9. a. Describe the ecosystem structure changes that occur during early successional stages (pioneer plants) and late successional stages (climax) using the figure shown below. [6]

b. Why does the climax or last stage of succession not change into a different successional stage unless a major change occurs? [2]

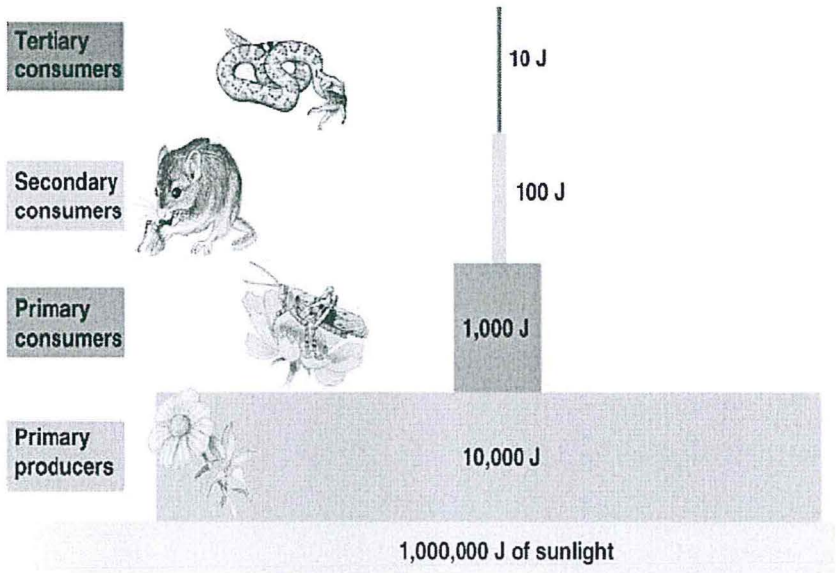
10. Define population genetics? Explain why understanding population genetics is important to an ecologist like you. [4]

11. a. Given a food-web diagram shown below, correctly identify, (a)



i. Producer [2]
ii. Herbivore [2]
iii. Carnivore [1]
iv. Omnivore [1]

b. Examine the pyramid of net production diagram given below and answer the following questions



What percentage of the energy in plants makes it into the bodies of

i. Primary consumers [1]
ii. Secondary consumers [1]

iii. Tertiary consumers [1]

12. One of the goals of Namibia 's Ministry of Environment, Forestry and Tourism in its new 2040 agenda is to develop strategies for a sustainable environment. Imagine, you have been appointed by the Minister to carry out this task, outline and discuss the strategies for a sustainable environment that you will present to the Minister. [20]

END OF QUESTION PAPER