



FACULTY	AGRICULTURE, ENGINEERING & NATURAL SCIENCES
DEPARTMENT	ENVIRONMENTAL SCIENCE (BIOLOGICAL SCIENCE)
SUBJECT	ECOSYSTEM ECOLOGY
SUBJECT CODE	EBL3712
DATE	OCTOBER / NOVEMBER 2021
DURATION	3 Hours
MARKS	120

REGULAR EXAMINATION

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Moderator: Dr. W.C. Nesongano (University of Namibia)

This question paper consists of 5 pages (including this front page)

Instructions

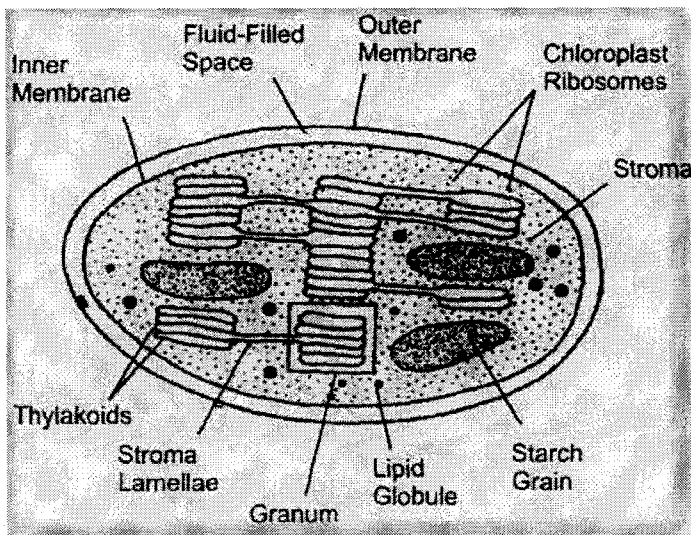
- Section A: Compulsory
- Section B: Answer 2 questions only
- Use of scientific calculators is permitted

SECTION A: COMPULSORY QUESTIONS

Answer all questions in this section.

Question 1: [15]

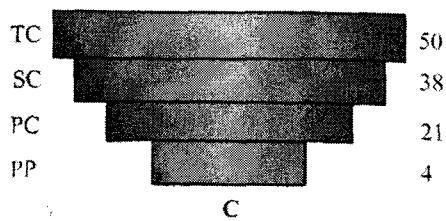
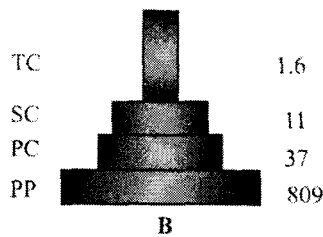
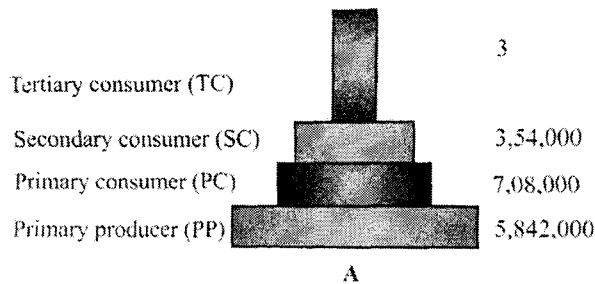
Study the diagram below showing the anatomy of a chloroplast and answer the following questions:



- 1.1. Where in the chloroplast do the 2 main stages of photosynthesis occur? (2)
- 1.2. Describe in general the two main stages of photosynthesis including, their main differences as well as the reactants and the products. (8)
- 1.3. Based on your understanding of the process of photosynthesis, predict what will happen to a plant leaf that loses CO_2 too quickly. (2)
- 1.4. An inadequate supply of water can compromise plants' ability to carry out photosynthesis. How do desert plants prevent such water loss when they are subjected to high heat? (3)

Question 2 [15]

Study the following ecological pyramids carefully and answer the questions below:



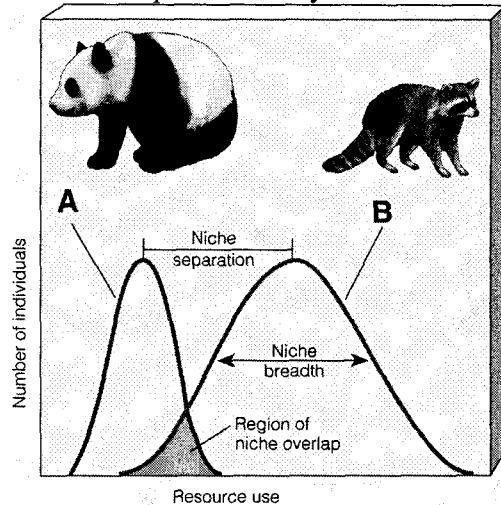
- 2.1. Compare the three types of ecosystem pyramids and how well they describe ecosystem structure. Identify which ones can be inverted and give a specific example for each pyramid. (9)
- 2.2. In the ecological pyramid A, which type of consumer gets only 10% of the energy stored in plants? (1)
- 2.3. Give three ways in which biomass can be lost between trophic levels. (3)
- 2.4. What would happen to a food chain if the producers were eliminated? (2)

Question 3: [15]

- 3.1. Distinguish between the following terms: Functional, Compositional and Structural diversity, giving example of each. (6)
- 3.2 Many endemic species are found in areas that are geographically isolated. Suggest a plausible scientific explanation why this is so. (2)
- 3.3 Explain why species diversity is generally high in diffuse ecotones. (4)
- 3.4. Why is biodiversity considered vital for the functioning of an ecosystem? (3)

Question 4: [15]

The picture below shows two organisms with their niche breadth along a resource use dimension in a Prairie pothole ecosystem



- 3.1. In the figure above, which letter represents the species most likely to become threatened or endangered and why? (3)
- 3.2. Prairie potholes are being lost at an alarming rate. What two things could happen to the animals which rely on the potholes? (2)
- 3.3. Explain what an ecological niche is and what factors can influence organisms' niches. (4)
- 3.4 Distinguish between keystone species and species that are dominant on the basis of their density. (6)

Question 4: [15]

4.1 Imagine you collected plants from two communities, each covering 0.5ha. In each community, you counted the number of individuals of each species and recorded your data as shown in Table 1.

Table 1. Abundance of different species collected from two hypothetical plant communities.

	Community 1		Community 2	
	Species	Count	Species	Count
1	<i>Albizia foressi</i>	3	<i>Grewia villosa</i>	11
2	<i>Albizia amara</i>	2	<i>Acacia karoo</i>	9
3	<i>Acacia nilotica</i>	19	<i>Albizia foressi</i>	12
4	<i>Grewia tenax</i>	3	<i>Acacia kirki</i>	10
5	<i>Grewia villosa</i>	1	<i>Acacia nilotica</i>	9

6	<i>Carissa edulis</i>	4	<i>Albizia amara</i>	13
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- (a) Calculate dominance in both communities and express your answers as a community dominance index. (4)
- (b) Calculate the Simpson's index of diversity for the two communities. Show all calculations. (6)
- (c) Which community is more diverse and why, when you use:
- (i) Species richness (2)
 - (ii) Heterogeneity measures of species diversity? (2)
 - (iii) List the disadvantage of the Simpson's index of diversity. (1)
- [60]

SECTION B:

Answer any two questions from this section (60 marks)

Question 1:

Write an essay discussing the three photosynthetic pathways, giving examples of each pathway and discussing the main differences: (30)

OR

Question 2:

Namibia and other drier countries of the world are at high risk of Desertification. Discuss the following manifestations of desertification critically:

- (a) **Land degradation**
 - (b) **Floods**
 - (c) **Bush encroachment**
- (30)

OR

Question 3:

Write an essay to discuss and differentiate between the Savanna and Woodland biomes you have studied. Include in your essay the location, climate, soils, vegetation as well as environmental impact of human activities on each biome. (30)

Total: [120]