



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY
FACULTY OF NATURAL RESOURCES AND SPATIAL SCIENCES
DEPARTMENT OF AGRICULTURE AND NATURAL RESOURCES SCIENCES**

QUALIFICATION: BACHELOR OF NATURAL RESOURCES MANAGEMENT (NATURE CONSERVATION)	
QUALIFICATION CODE: 07BNTC	LEVEL: 7
COURSE CODE: NCE510S	COURSE NAME: Nature Conservation Ecology 1
DATE: July 2019	
DURATION: 3 HOURS	MARKS: 150

SECOND OPPORTUNITY AND SUPPLEMENTARY EXAMINATION QUESTION PAPER	
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MODERATOR:	Mr. H. Tjikurunda

INSTRUCTIONS
1. Answer ALL the questions. 2. Write clearly and neatly. 3. Number the answers clearly.

PERMISSIBLE MATERIALS

1. Examination question paper
2. Answering book

THIS QUESTION PAPER CONSISTS OF 6 PAGES (Including this front page)

Section A

Question 1

Provide definitions for the following words/phrases.

- 1.1 Synecology (1)
- 1.2 Mineralization (1)
- 1.3 Second law of thermodynamics (1)
- 1.4 Weather (1)
- 1.5 Folivore (1)
- 1.6 Capillary water (1)
- 1.7 Net Primary Production (NPP) (1)
- 1.8 Pyramid of biomass (1)
- 1.9 Liebig's law of the minimum (1)
- 1.10 Mutualism (1)

[10]

Question 2

Provide the word(s) that best explain the definitions below.

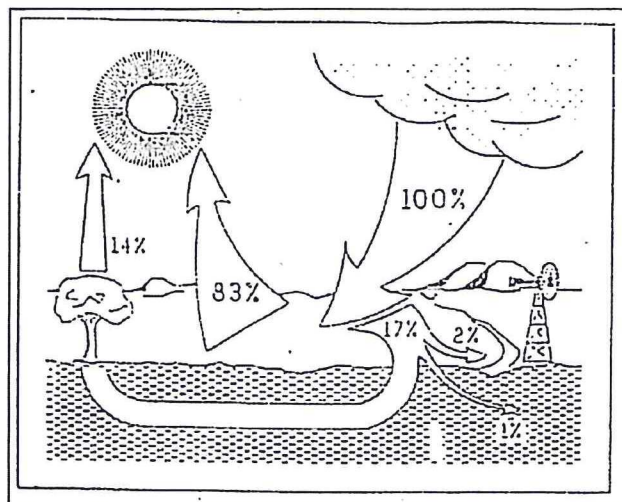
- 1.1 Soil transported by wind movement (1)
- 1.2 This is the quantity of water which is retained by a soil after drainage by adhesion and cohesion (1)
- 1.3 Where two or more different vegetation communities meet abruptly. (1)
- 1.4 Energy intake from digested food. (1)
- 1.5 Soils in which sodium salts have reached a certain critical level (1)
- 1.6 When a plant or animal dies, or an animal expels waste, nitrogen is returned to the soil (1)
- 1.7 Population 1 is inhibited but population 2 is not affected in any way (1)
- 1.8 Climatically and geographically defined large areas of ecologically similar communities of plants, animals/ecosystems (1)
- 1.9 When soil material is removed from one horizon to another (1)
- 1.10 Refers to the relative proportions of the different soil factions (sand, silt and clay) in a soil (1)

[10]

Section B

Question 3

- 3.1 Discuss how ecosystem location and topography affect the structure of an ecosystem? (4)
- 3.2 State which climatic conditions are prevalent when the Inter Tropical Convergence Zone moves southwards. (1)
- 3.3 Study the diagram below and answer the questions that follow:

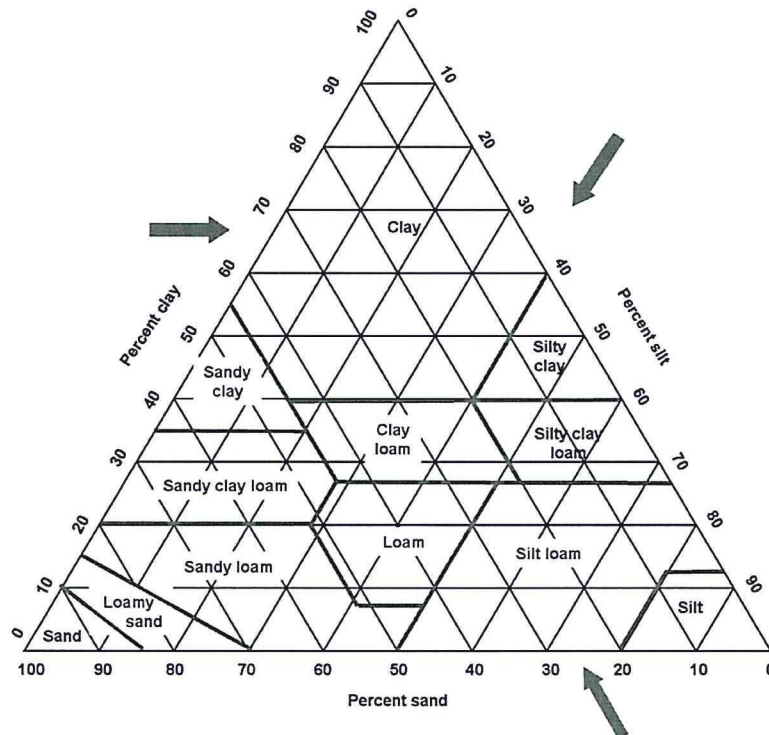


An average rainfall of 560mm was received in Otavi in 2018.

- a) How many mm of rainfall was used by vegetation? (1)
 - b) How many mm of rainfall recharged the ground water? (1)
 - c) If the soil was a sandy soil, how would this affect the 1% arrow? Would it increase or decrease? Explain (2)
- [9]

Question 4

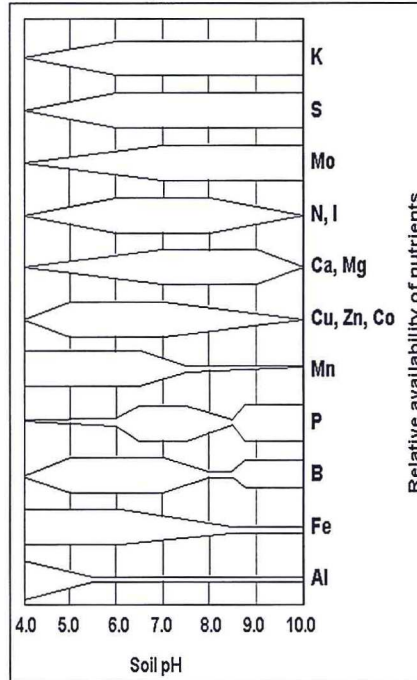
- 4.1 Name two types of sedimentary rocks found in Namibia? (2)
- 4.2 State one defining characteristic of the A-horizon. (1)
- 4.3 Study the soil texture triangle below and answer the questions that follow:



Determine the soil type for the following soil compositions:

- a) 45% silt, 50% clay (1)
- b) 10% clay, 75% sand (1)
- 4.4 Discuss how water retention and aeration differ between sandy, loam and clay soils. (6)
- 4.5 Explain why macropores are important in a soil and in which soil type is it most prevalent? (2)
- 4.6 Cation Exchange Capacity (CEC) is defined as the ability of colloids to attract exchangeable cations to their active sites. Discuss two reasons why clay soils have a high CEC but plants struggle to survive in this soil type. (3)

4.7 Study the figure below and answer the questions that follow:



- a) At which soil pH's is Boron most available to plants and what is the use of this nutrient to plants? (2)
- b) At which soil pH's is nitrogen unavailable to plants and what type of nutrient is nitrogen classed as? (2)

4.8 Explain what humus is and why is it important in the soil? (4)

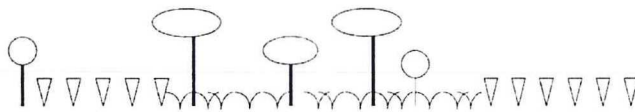
[24]

Question 5

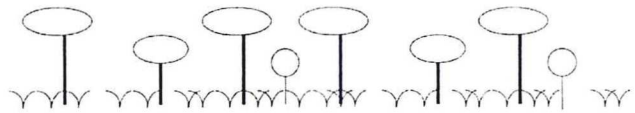
5.1 Study the figure bellow and answer the questions that follow:



a



b



c

Key to growth forms:

= grass

= Woody shrub

= tree

- a) Three habitats a, b and c are represented above. Place them in order of expected grazer species richness and explain your choice. (4)

- b) In terms of vertical and horizontal spatial heterogeneity, one of the three habitats have the highest overall species richness. Indicate which one and motivate your answer. (4)

5.2 The grass assemblages of two habitats were recorded using the descending point method and the results are recorded below:

Species	Total species count in Habitat A	Total species count in Habitat B
A	8	2
B	0	10
C	19	4
D	2	65
E	7	13
Total	36	94

- a) Calculate the relative abundance (dominance) of species D in both habitats. (4)
 b) Calculate species richness for both habitats. (2)
- 5.3 Explain how each of the following factors influence species diversity: (8)
- Habitat size
 - Predictability of change
 - Primary productivity
 - Evolutionary time

5.4 Study the table below and answer the questions that follow:

Biome	Source	Production	
		kg.msq/yr	Tons/ha/yr
Tropical rain forest	Whitaker & Likens (1973)	2	20
Savanna	Whitaker & Likens (1973)	0.7	7
Temperate grassland	Whitaker & Likens (1973)	0.5	5
Cultivated land	Whitaker & Likens (1973)	0.644	6.44
Boreal forest	Whitaker & Likens (1973)	0.8	8
Temperate deciduous forest	Whitaker & Likens (1973)	1.2	12
Tundra	Whitaker & Likens (1973)	0.144	1.44
Desert	Whitaker & Likens (1973)	0.071	0.71
Swamp and marsh	Whitaker & Likens (1973)	2.5	25
Lake and stream	Whitaker & Likens (1973)	0.5	5
Estuaries	Whitaker & Likens (1973)	1.8	18
Upwelling zones	Whitaker & Likens (1973)	0.5	5
Continental shelf	Whitaker & Likens (1973)	0.36	3.6
Open ocean	Whitaker & Likens (1973)	0.127	1.27
Fire climax grassland*	Tainton (1999)	0.35	3.5
Fire climax grassland*	Tainton (1999)	0.3	3
Climatic climax grassland*	Tainton (1999)	0.3	3
Climatic climax grassland*	Tainton (1999)	0.1	1
Savanna (moist)	Tainton (1999)	0.2	2
Savanna (dry)	Tainton (1999)	0.05	0.5
Karoo	Tainton (1999)	0.3	3
Karoo	Tainton (1999)	0.15	15
Karoo	Tainton (1999)	0.05	0.5

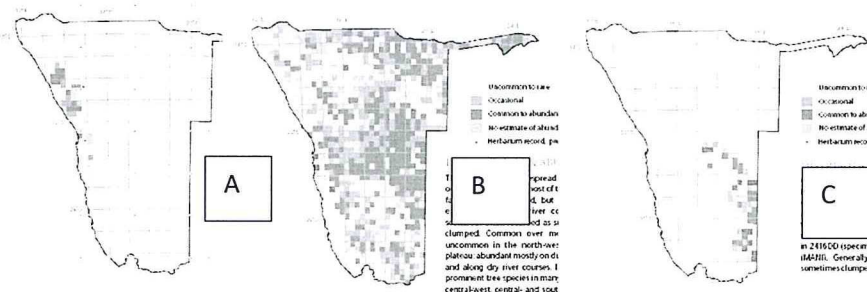
- a) List the three most productive ecosystems in order of decreasing primary productivity. (3)
 - b) Discuss two factors which the ecosystems above share that make them so highly productive. (2)
- 5.5 Define assimilation efficiency and discuss three factors that affect this efficiency. (7)
- 5.6 Using the "ten percent rule", how many trophic levels could 750 ha of Savanna support, assuming that the top predator weighs around 110 kg? Show your calculations and explain your conclusions. Indicate the feeding group of organisms found in each trophic level and give a realistic example at each level. Note: The Primary Productivity of a Savanna is 7 tons/ha/year (20)
- [54]**

Question 6

- 6.1 State two reasons why nitrogen is important to life on earth. (2)
 - 6.2 Nitrogen fixation is defined as the process by which nitrogen gas (N₂) from the atmosphere is converted into ammonia (NH₃)/ammonium/Nitrates. Discuss three ways that nitrogen fixation takes place. (3)
 - 6.3 Discuss two ways in which humans influence the nitrogen cycle. (2)
 - 6.4 Discuss how the greenhouse effect contribute to global warming? (5)
- [12]**

Question 7

7.1 Consider the following insect species distribution maps for Namibia and answer the questions that follow:



- a) Class each of the species as eury-something or steno-something with regards to temperature. Explain each answer. (6)
 - b) Are species A and C sympatric or allopatric? Explain your answer. (2)
 - c) How would you describe each of the species with regards to their habitat tolerance? (3)
 - d) Provide an example of a stenohydric organism and explain why such an organism might be more vulnerable to extinction than a euryhydric organism. (3)
 - e) Explain the terms competitive exclusion and resource partitioning and provide an example of both. (4)
- [18]**

Question 8

- 8.1 State the characteristics of the early pioneer grass communities. (5)
 - 8.2 Discuss the process of progressive secondary succession in grass plants. (8)
- [13]**

Total [150]