



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**Natural Resources and Spatial Sciences**

Agriculture and Natural Resource Sciences

<b>QUALIFICATION: Bachelor of Agriculture</b>	
<b>QUALIFICATION CODE: 07BAGR</b>	<b>LEVEL: 7</b>
<b>COURSE: Rangeland Management</b>	<b>COURSE CODE: RMN610S</b>
<b>DATE: 14 June 2019</b>	<b>SESSION: 13:00</b>
<b>DURATION: 3 Hours</b>	<b>MARKS: 100</b>

<b>FIRST OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
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**THIS EXAMINATION QUESTION PAPER CONSISTS OF 5 PAGES**  
(Excluding this front page)

**INSTRUCTIONS**

1. Answer all the questions
2. Show clearly all the steps used in any calculations
3. Failure to follow instructions may result in deduction of marks

**PERMISSIBLE MATERIALS FOR STUDENTS**

1. Calculator.

Question 1

Plant identification is important for a rangeland scientist. Below is a list of different plant species that fall under different plant types or classes such as annual grasses, perennial grasses, forbs(dicots), forbs (monocots), bushes and trees:

*Chloris virgate, Acacia erioloba, Kyllinga alba, Anthephora pubescens, Leucosphaera bainsii, Enneapogon cenchroides, Cynodon dactylon, Boscia albitrunca, Commelina benghalensis, Anthephora schinzii, Cleome gynandra, Croton gratissimus, Schmidtia kalahariensis, Brachiaria nigropedata, Tarchonanthus camphoratus, Cyperus sp., Nidorella resedifolia, Aristida congesta, Xerophyta humilis and Pechuel-Loeschea luebnitziae*

In the table below, rearrange the above-mentioned species into their respective classes: annual grasses, perennial grasses, forbs(dicots), forbs (monocots), bushes and trees:

Annual grasses	Perennial grasses	Forbs (dicots)	Forbs (monocots)	Bushes and trees

[20]

Question 2

The most critical time of the year for grazing management is usually at the start of the rainy season. Explain how you would advise a farmer to minimise harm to her perennial grass:

- 2.1 If the farmer has some areas with sandy soil and other areas with loamy soil. (4)
- 2.2 If the farmer has a large artificial pasture of *Cenchrus ciliaris* cultivar Molopo. (4)

Question 3

The annual dry feed requirements are considered by the Ministry of Agriculture, to be 21.9 kg DM / kg liveweight. Explain each of the three assumptions from which this figure was derived [6]

Question 4

To illustrate your understanding of the restoration work performed at Krumhuk during the excursion in March , answer each of the following:

4.1 With the aid of a localized sketch map, explain the induced meandering function of the two filters that were secured at one edge of a straight section of gully. (5)

With the aid of a wider sketch map that covers from west of the campsite to below the Vlaagte Dam, explain the functions of diversion, suspended and ground filters placed by former students and strengthened by you [10]

Question 5

Suppose that monitoring by a farmer shows that, in order to prevent over-grazing, the maximum grazing period should not exceed 7 days under fast growth and 28 days under slow growth. While the minimum rest period should be at least 36 days under fast growth and 150 days under slow growth. However, he can only afford to allocate four paddocks per herd of cattle.

Make use of a table, like that below, to show your figures:

	Based upon maximum grazing		Based upon minimum rest	
	Fast growth	Slow growth	Fast growth	Slow growth
Grazing period				
Rest period				

✓ = correct timing    ✗ = slight overgrazing    ✗✗✗ = destructive overgrazing

[8]

Question 6

Name and explain different methods used to construct and maintain fire breaks

[10]

Question 7

Suppose that you obtained the results indicated in Table 1 for Bitterlich gauge measurements from 25 points on farm Krumhuk. Show the steps that you use to estimate the canopy cover of each of the five species of bushes and trees, while writing out their names in full. Then comment on the woody canopy cover condition of this rangeland.

**Table 1. Cover of woody plants above 0.5m height by Bitterlich gauge, for multiplier of 5**

Survey No. \_16\_ Date: \_9/3/16\_ Place: \_\_Krumhuk\_\_ Surveyors: \_Panduleni, Maria, Gerson\_\_

Species	1	2	3	4	5	6	7	8	9	10	11	12	
AMEL	###	III	III	IIII	### I	### I	###	### III	IIII	III	IIII	### I	
TCAM	I		II			I	I	I					
ZMUC					I								
AERI			I					I					
ERIG									I				
Species	13	14	15	16	17	18	19	20	21	22	23	24	25
AMEL	### I	### I	III	### I	### I	###	II	IIII	III	### I	IIII	IIII	III
TCAM			II	I						I			
ZMUC					I								
AERI	I							I				I	
ERIG			I	I									

[8]

### Question 8

Copy down the table below and fill in the blank cells based on the case study of adaptive rangeland management applied by the innovative Kalahari farmer, appearing in the study guide. The first blank column should provide the farmer's explanation for his observation and the second blank column should briefly describe how the farmer applies that knowledge to his rangeland management.

<b>Observation of Kalahari case study farmer</b>	<b>Possible explanation given by Kalahari case</b>	<b>Management application</b>
8.1 When stocking rate is increased slightly, young plants are badly damaged while middle-aged plants recover more easily.		
8.2 If senescing perennial grasses are grazed or trampled, they tend to rejuvenate, competing with new grass seedlings, and do not produce sufficient mulch or forage of good quality.		
8.3 The condition of perennial grass is much better in a small paddock, compared to that in a neighbouring large paddock, despite being grazed at the same stocking rate		
8.4 Runoff rainwater tends to soak into the ground on a certain part of the farm		

8.5 When mature Acacia mellifera bushes are harvested for droppers, they are replaced by seedlings only if chopped during a year of good rains and not during drought.		
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[20]

Question 9

Drought occurs naturally in Namibia; the year 2013 was declared a drought year due to below average rainfall received in most parts of the country. As an extension officer, you are asked to put in place advanced management strategies in order to reduce the negative impact of a drought. What would your advice be to farmers in this regard.

[10]