



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF NATURAL RESOURCES AND SPATIAL SCIENCES
DEPARTMENT OF AGRICULTURE AND NATURAL RESOURCES SCIENCES**

QUALIFICATION: BACHELOR OF AGRICULTURE	
QUALIFICATION CODE: 07BAGR	LEVEL: 5
COURSE CODE: SSA520S	COURSE NAME: SOIL SCIENCE
SESSION: JANUARY 2020	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

SUPPLEMENTARY / SECOND OPPORTUNITY EXAMINATION QUESTION PAPER

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INSTRUCTIONS

1. Marks for each question are indicated
2. Answer each question on a separate answer sheet
3. Provide your name and student number on the answer booklet(s)

THIS QUESTION PAPER CONSISTS OF 4 PAGES (Excluding this front page)

PERMISSIBLE MATERIALS

1. All written work **MUST** be done in blue or black ink
2. No books, notes and other additional aids are allowed
3. You are allowed to use a scientific calculator in this examination

ANSWER ALL QUESTIONS**[100 MARKS]****QUESTION 1**

- a) The _____ is a vertical section through soil mass
- A. Soil erosion
 - B. Soil profile
 - C. Both A and B
 - D. None of the above
- b) Wind erosion is common in
- A. Humid zones
 - B. Arid zones
 - C. Arid and semi-arid zones
 - D. Arid and Humid zones
- c) Wind erosion is more in
- A. Cohesive soil
 - B. Non cohesive soil
 - C. Rocky soil
 - D. All of the above
- d) The reason for wanting to organize soil knowledge is the basis for:
- A. The principle of prioritization
 - B. The principle of classification
 - C. The principle of purpose
 - D. The principle of identity

e) The mass of dry soil is 380 grams, if the particle density is 38g/cm^3 then:

- A. The soil bulk density is $> 39\text{g/cm}^3$
- B. The soil bulk density is $< 38\text{g/cm}^3$
- C. The soil bulk density is about 39g/cm^3
- D. The soil bulk density is unknown

[10]

QUESTION 2

Define and explain sheet and rill erosion.

(10)

QUESTION 3

3.1 Excluding the human factor, name the five factors of soil formation.

(5)

3.2 What is nitrogen fixation and why is it important?

(5)

3.3 According to three principles of soil classification, explain what is meant by "Organization"?

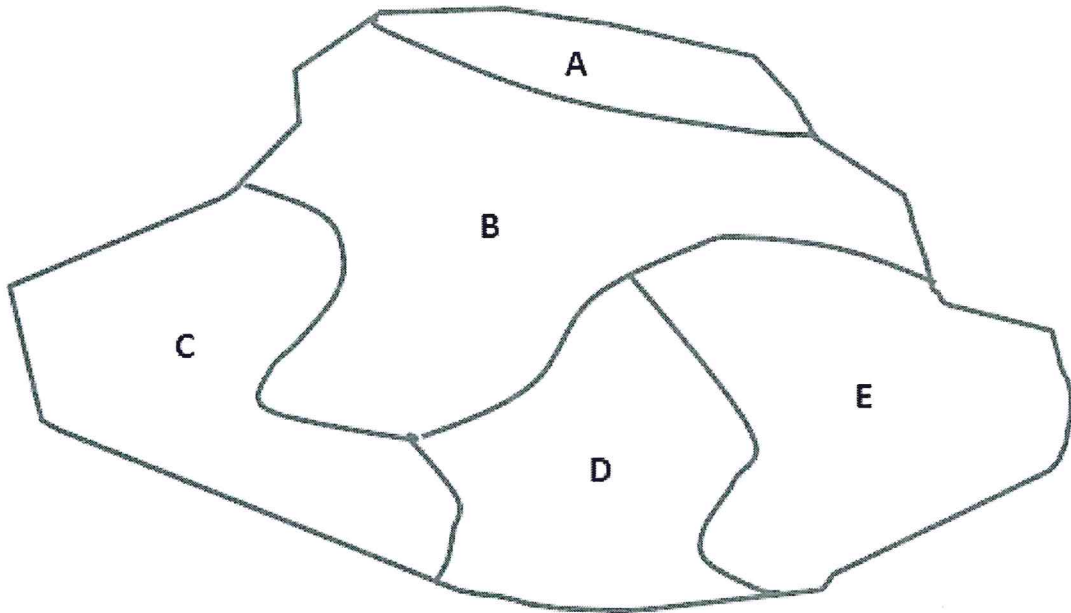
(20)

[30]

QUESTION 4

4.1 Study the table and the hypothetical soil map information below. How many tonnes of sulfur or lime will be applied to each mapping unit to lower or raise the soil Ph? (15)

Lime Requirements to raise pH in the top 15 cm of the soil (45 kg/m^2)					
pH	Sand	Loam	Clay	Sandy Loam	Clay Loam
6.0 to 6.5	1.5	4.2	-	3.2	5.5
Sulfur Requirements to Lower pH in the 15 cm of the soil (45 kg/m^2)					
pH	Sand	Loam	Clay	Sandy Loam	Clay Loam
7.0 to 6.5	0.25	0.35	0.70	-	-



Soil Map 1: 27,400

Soil Mapping unit	Topsoil Texture	Soil pH	Area (ha)
A	Sand	7	300
B	Sandy loam	6	1000
C	Clay loam	6	750
D	Clay	7	750
E	loam	6	800

4.2 Draw a diagram showing how rainfall erosivity and soil erodibility factors contribute to soil's susceptibility to water erosion

(10)

[25]**QUESTION 5**

5.1 The table below is soil profile analysis data. Using the data determine the soil texture of the seven horizons.

(9)

Horizon	Depth (Cm)	Particle Size Distribution	
		Sand	Silt
Ap	0-12	48	16
Bw1	12-35	47	17
Bw2	35-48	45	17
Bw3	48-76	46	18
Bwk1	76-96	39	19
Bwk2	96-126	39	20
Bck	126-155	27	24

5.2 Soil plant nutrients can be divided into two groups, that is, nutrients from air and water and nutrients from the soil, lime and commercial fertilizers. Using the table below list all the nutrients under each column in the table. (16)

PLANTS ESSENTIAL NUTRIENTS			
Nutrients from Air & water	Nutrients from Soil, Lime and Commercial Fertilizers		
	Primary Nutrients	Secondary Nutrients	Micronutrients

(16)

[25]