NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF NATURAL RESOURCES AND SPATIAL SCIENCES

DEPARTMENT OF AGRICULTURE AND NATURAL RESOURCES SCIENCES

QUALIFICATION: BACHELOR OF NATURAL RESOURCE MANAGEMENT IN NATURE CONSERVATION	
QUALIFICATION CODE: 07BNTC	**LEVEL:** 7
COURSE CODE: PTS710S	**COURSE NAME:** Plant Studies 2
DATE: July 2019	**PAPER:** THEORY
DURATION: 3 Hours	**MARKS:** 150

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	Dr. J. M. Kamwi
MODERATOR:	Mrs. G. L. Theron

INSTRUCTIONS

1. Answer ALL five (5) questions.
2. Read all questions carefully before answering.
3. Number your answers clearly.
4. Make sure your student number appears on the answering script.

PERMISSIBLE MATERIALS

1. Examination paper.
2. Examination script.

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

Question 1

1.1 Briefly describe the following:
- a. A Decreaser [1]
- b. An Increaser II [1]
- c. An Increaser III [1]
- d. An Increaser IV [1]

1.2 Why is it important to know the categories of grasses in 1.1 and how would you use such knowledge in veld management? [2]

1.3 What is the difference between the awns of the following genera?
- a. *Stipagrostis* [1]
- b. *Aristida* [1]
- c. *Enneapogon* [1]
- d. *Schmitia* [1]

1.4 The following pairs or groups of taxa are very similar. How would you tell the difference between them? Give one characteristic that would tell you immediately which of the two species it is.
- a. *Acacia erubescens* & *Acacia fleckii* [2]
- b. *Boscia foetida* & *Maerua parvifolia* [2]
- c. *Grewia flavescens* & *Grewia flava* [2]

1.5 Give the diagnostic characteristic/s of the following taxa:
- a. Cucurbitaceae [1]
- b. Malvaceae (new taxonomy) [1]
- c. Capparaceae [1]
- d. Asteraceae [1]

1.6 Succulence is an adaptation to aridity. Explain the meaning of this term. [4]

Question 2

2.1 What was the basis of the Natural system of classification, state why the system was considered controversial and was not easily accepted and then name a theory that helped in the acceptance of the system and one of the key people who proposed that theory? [7]

2.2 Plant systematics is considered very important; outline the five objectives of plant systematics. [10]

Question 3

3.1 Plants, like animals, are classified in a hierarchical arrangement. Within a family are a number of genera, each with a different form of the distinguishing characteristic(s). And within the genus are a number of species, again with a different form of the distinguishing characteristic of the genus.
- a. Illustrate this within the Rubiaceae (in words). [7]
- b. Compare the leaf arrangement in the two genera of Rubiaceae studied. [2]

3.2 The family Fabaceae is one of the most important and diverse families in Namibia. The family is regarded by some taxonomists as having three subfamilies, while others regard the three subfamilies as independent families. Which taxonomy would you support (three subfamilies or 3 [12]

families?). Motivate your answer and describe the distinguishing characteristics of the three.

3.3 Choose three of the following Namibian edible fruit species. For each one (a) briefly describe the plant, giving the most important identifying characteristics. (half mark per characteristic total 2 marks) (b) describe its habitat (c) where in Namibia does it occur? (d) describe the fruit (e) to which family does it belong? [18]

Sclerocarya birrea; Strychnos spp; *Ximenia americana; Garcinia livingstonei.*

3.4 The Succulent Karroo is one of southern Africa's biodiversity hotspots.

a. Explain why this is. [2]

b. Name the two most dominant plant families in the biome and explain how you can tell them apart. [6]

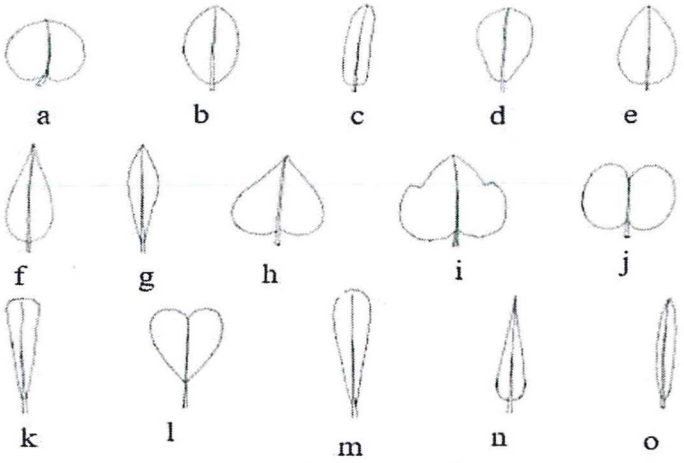
3.5 Name the two most important woody genera of Capparaceae in Namibia and how else can you distinguish between these two genera? [6]

3.6 Plants are valuable for several uses, some of the species in Namibia are economically valued, look at the following species and provide their full scientific names, the plant families they belong to, their main valued economic uses and their market size or location. [20]

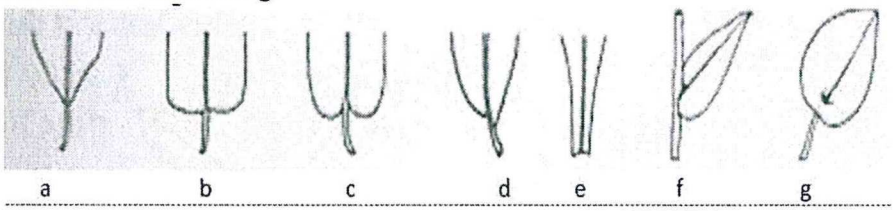
a. Devil's claw
b. Monkey Orange
c. Marula
d. ! Nara

Question 4

4.1 Label the leaf shapes a-o. [15]



4.2 Label leaf bases a to g. [7]



Question 5

5.1 For the following species give (a) the scientific name (b) the family (c) economic importance in Namibia (d) distribution in Namibia. [5]
V-shaped shrub or small tree with bipinnately compound leaves, 2-3 pinnae pairs; each pinna with 1-2 leaflets pairs; leaflets 10 x 5 mm; strongly curved paired thorns at nodes; flowers in round, creamy white heads; bark with white lenticels.

5.2 Kiaat is a valuable species in Namibia. Mention its proper scientific name, family name, its main use and its targeted market. [5]

5.3 Name any two pitfalls to look out for when identifying plants. [4]

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DATE: June 2019	**PAPER:** THEORY
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FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	Dr. J. M. Kamwi
MODERATOR:	Mrs. G. L. Theron

INSTRUCTIONS

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

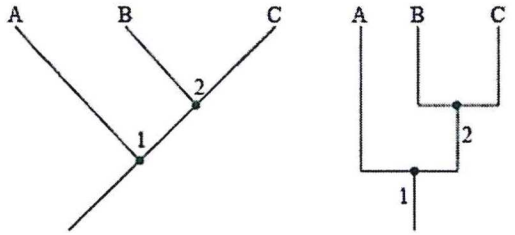
Question 1

1.1 Discuss the role of taxonomy in conservation and preservation of biological diversity. [10]

1.2 Define type specimen, diagnostic character and derived character. [3]

1.3 List 4 advantages of the binomial system of nomenclature. [4]

1.4 The figures below shows two styles of the cladogram. (a) do the figures show the same thing? (b) describe what the figures depicts, and (c) indicate which species is the oldest and why? [5]



1.5 Which taxonomic rank is more specific than order but less specific than genus? [1]

1.6 Compare the artificial and the natural systems of classification in terms of their basis. [4]

1.7 Name and explain some of the advances of angiosperms over gymnosperms. [10]

1.8 Outline 5 challenges faced within the indigenous natural plant products sector. [5]

1.9 Explain the material transfer agreement (MTA) to which the NBRI is a party. [2]

Question 2

2.1 Mention the 3 family characteristics of Malvaceae *sensu lato*? [3]

2.2 Mention the 2 poisonous aliens from Euphorbiaceae. [2]

2.3 Mention the two subspecies of *Acacia tortilis* and give the characteristics of each. [4]

2.4 Mention the 2 subspecies of *Combretum apiculatum* and give the characteristics of each. [4]

2.5 Tamboti is a valuable species; mention its proper scientific name, family name, its main use and its targeted market. [4]

2.6 What is the diagnostic characteristic of the genus *Grewia*? [2]

2.7 Name the two groups of angiosperms and differentiate them in terms of roots, leaf venation, leaf sheath and floral whorls. [10]

2.8 Why do endemics have higher protection status than other indigenous species in Namibia? [4]

2.9 When it comes to identifying plants, some features are considered vegetative and some are reproductive. Mention whether the following features are vegetative or reproductive: a. Flowers, b. Twigs, c. Stem, d. Roots, e. Fruit. [5]

Question 3

3.1 List the different infloresences of the following species: [6]

a. *Heteropogon contortus*
b. *Chloris virgata*
c. *Centropodia glauca*
d. *Setaria verticillata*
e. *Stipgrostis ciliata*
f. *Pogonathria squarrosa*

3.2 The following characteristics are typical of some of the most important grass species in Namibia. Identify the species and indicate the grazing value of the grass species e.g. decreaser or increaser. [14]

a. Description

Tufted perennial, with dense basal leaf-cover, numerous young shoots and hairy scale leaves. **Culms** erect or slightly geniculate, unbranched, up to 0.8 m high. **Leaf blade** hairless to densely hairy, up to 200 x 6 mm.

Ligule short, membranous, up to 2.5 mm long, with fringed tip. **Leaf sheath** keeled, covered with dense, silky hairs at base. Inflorescence composed of 3-11 racemes, arranged digitately at culm tip or on shortened central axis.

Spikelets up to 3.5 mm long, conspicuously hairy, green, but often flushed with purple.

b. Description

Coarsely tufted annual. **Culms** erect or geniculate, often flushed purple, especially at nodes, 0.2-1.2 m high. **Leaf blade** smooth, up to 300 x 16 mm; margin pale yellow, rough due to very fine bristles; base rounded, with long, bulbous-based bristles. **Ligule** a dense fringe of shiny hairs.

Leaf sheath smooth, with fine hairs; margin hairy, often purple in upper half. **Inflorescence** usually composed of 5-6 irregularly-spaced, one-sided racemes that are 10-60 mm long.

Spikelets narrowly ovate, 3.5-6 mm long, often flushed dark purple; lower glume with few hairs.

c. Description

Tufted annual, densely covered with short, glandular hairs. **Culms** erect or semi-erect to geniculate, sometimes branched, sometimes rooting at lower nodes, up to 1 m high. Leaf blade flat or rolled, tapering to thread-like point, densely covered with glandular hairs, up to 300 x 8 mm. **Ligule** a fringe of short hairs. Leaf sheath round, densely covered with glandular hairs. **Inflorescence** a dense, spike-like

panicle, 50-200 mm long, somewhat contracted. **Spikelets** vary from pale to dark grey through to grey-green, 4-6 mm long; lemma with 9 hairy awns.

d. Description

Soft, tufted perennial, with oblique, creeping rhizome and dense basal leaf-cover. **Culms** erect, slender, unbranched, with one node, up to 0.9 m high. **Leaf blade** often pinkish or purplish, concentrated at base of plant, tapering to sharp, pointed tip, strongly curled when dry, with or without long, soft hairs. **Ligule** a fringe of short hairs. **Leaf sheath** striate, with or without hairs, somewhat squarish in cross-section. **Inflorescence** a stiff, inflexible, open or slightly contracted panicle, 50-250 mm long, only slightly branched.

Spikelets up to 20 mm long, strongly flattened, may be an even width throughout or pointed, pale green or dark olive-green.

e. Description

Loosely tufted annual. **Culms** usually geniculate to decumbent, often rooting at lower nodes, up to 400 mm high. Leaf blade flat, clasping at rooting at owe nodes, up to 400 mm high. **Leaf blade** flat, clasping at base, short, up to 60 x 4 mm; margin with evenly spaced bristly hairs. **Ligule** membranous, margin hairy. **Leaf sheath** rounded, smooth. **Inflorescence** a loosely spike-like raceme, up to 70 mm long, often enclosed by upper leaf sheath near base.

Spikelets covered with hooked barbs, densely clustered, on short stalks. 3.5-5 mm long, falling readily when mature, with a tendency to attach to clothes and fur.

f. Description

Perennial, with strong creeping rhizome and dense basal leaf-cover or branching profusely from the base, often shrub-like and forming lax tufts of up to 1 m in diameter under optimum conditions. **Culms** erect, unbranched or repeatedly branched, 0.6-1.5 m high. **Leaf blade** mostly flat, with or without hairs, tapering to soft point; margin thickened and somewhat crinkled; old leaves curling. **Ligule** membranous, up to 7 mm long, with stiff, long hairs. **Leaf sheath** of basal leaves somewhat compressed and papery, otherwise round, with or without hairs but with 6 mm long, stiff hairs on collar. **Inflorescence** a spike, 50-150 mm long and 4-10 mm in diameter, pale to dark grey or sometimes almost black.

Spikelets vase-shaped, up to 8 mm long, densely covered with stiff hairs.

g. Description

Profusely branched, shrub-like, tufted perennial, sometimes with short, hard rhizome. **Culms** erect or geniculate, branched, often woody, up to 1 m high. **Leaf**

blade bright green to blue-green, flat, tapering to long narrow point, usually hairless, otherwise with sparse hairs, up to 250 x 8 mm, curling when dry. **Ligule** a fringe of short, white hairs. **Leaf sheath** keeled, with or without hairs. Inflorescence a dense, bristly spike, up to 120 mm long, purple to almost white. **Spikelets** densely arranged on central axis, up to 5 mm long, *awnless,* hairless, single or in groups, surrounded by numerous wavy, often bent, bristles of which some are hairy and others not; spikelets and bristles fall together when mature.

Question 4

4.1 The Caesalpinioidae has the greatest diversity of flower shape, colour and form of all subfamilies of Fabaceae. Discuss this statement and provide any 2 examples of the species involved. [8]

4.2 How do the fruit of Fabaceae and Combretaceae differ? [4]

4.3 *Colophospermum mopane* has 4 diagnostic characteristics. List them. [4]

4.4 What is the tallest *Combretum* species with the smallest fruits? [2]

4.5 All members of a family have certain characteristics in common. These are the distinguishing characteristics. Sometimes a characteristic is unique, with no other families having that characteristic. An example is the presence of a compound fruit.

a. Name this family. [1]
b. Briefly explain what is meant by compound fruit. [2]
c. In Namibia there is only one genus of this family. What is it? [1]
d. In this genus, the compound fruit has become modified into a very unusual structure with a unique relationship between the fruit and its pollinators. Write critical notes on this relationship and identify the participants in such a relationship. [14]

Question 5

5.1 The taxa listed in column A have many uses. Choose the **most important use** from the list in column B. **NB no use in column B may be selected more than once**. Write down the number from column A and the corresponding letter from column B, example (1); D. [6]

Column A - taxon	**Column B – important use**
(1) *Colophospermum mopane*	A. Aromatic resin
(2) *Combretum apiculatum*	B. Browse for giraffe
(3) *Burkea africana*	C. Tanning leather
(4) *Boscia albitrunca*	D. Browse for kudu
(5) *Elephantorrhiza suffruticosa*	E. Timber
(6) *Commiphora wildii*	F. Fire wood

5.2 Give the families of species in question 5.1 (with careful attention to the spelling). [6]
Write down the number from column A and the family name.