

UNIVERSITY OF RUHUNA

BACHELOR OF SCIENCE (GENERAL DEGREE) LEVEL I (SEMESTER I)
EXAMINATION – October 2023

SUBJECT: BOTANY

COURSE UNIT: BOT1221 (Plant Systematics)

Time: 1 hr

Index No.

Answer for two questions

1.

i. Give the meanings of the following species epithets used in plant nomenclature. (15 Marks)

a. rhombifolia -

b. aquatica -

c. umbellata -

d. nigra -

e. latifolia -

ii. Given below is the scientific classification of Broccoli. Complete the corresponding taxonomic ranks of the classification. (15 Marks)

Kingdom– Plantae

..... – Brassicales

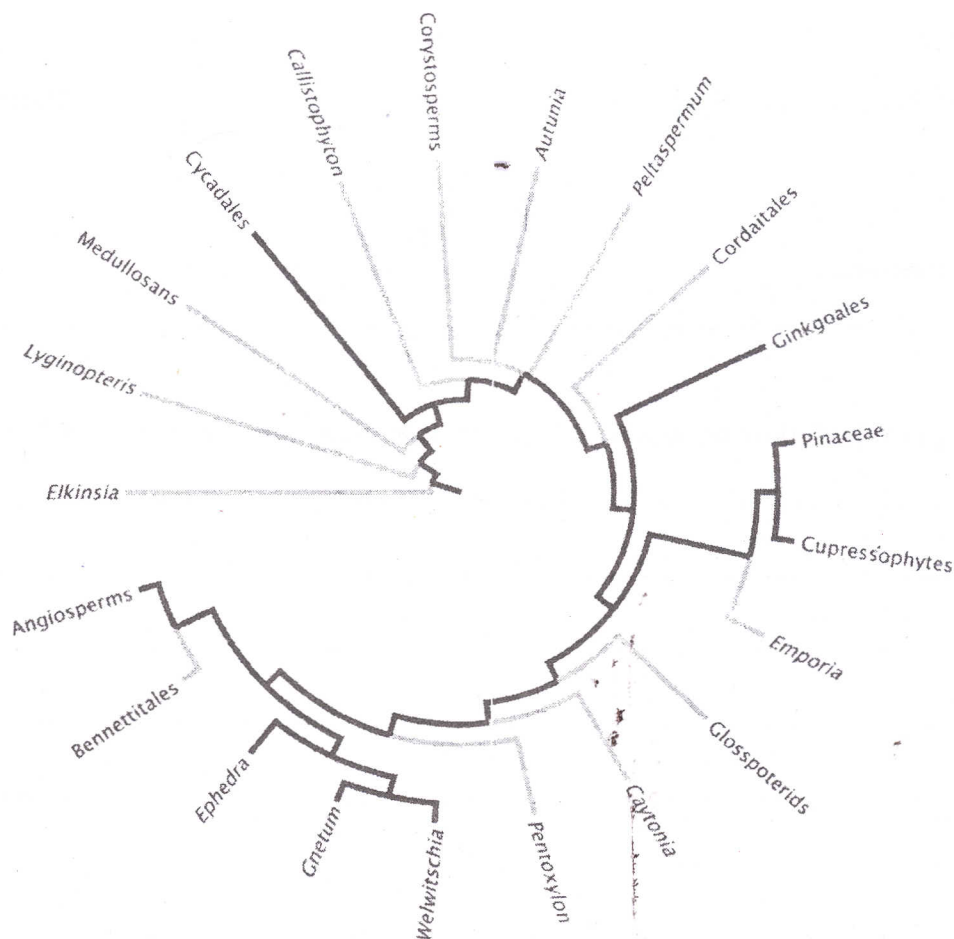
..... – Brassicaceae

..... – *Brassica*

..... – *Brassica oleracea*

..... – *Brassica oleracea* var. *italica*

iii. Given below is a phylogenetic tree based on DNA sequence data showing the evolution of Angiosperms and Gymnosperms. The dark lines and light lines indicate extant and extinct taxa respectively. Answer the following questions based on the phylogenetic tree.



a. What is the sister group of *Welwitschia* according to the above phylogenetic tree? (5 Marks)

b. Give the closest relative(s) of Pinaceae and Cupressophytes. (5 Marks)

c. "The branching order of some groups is uncertain according to the given phylogenetic tree." Briefly explain this statement. (10 Marks)

ng the evolution of
nt and extinct taxa

d. As Benitiales is an extinct plant family with morphological resemblance to Cycads, what can you conclude about the usage of DNA sequence data in the determination of the phylogeny of Angiosperms? (10 Marks)

iv. *Lycopodium phlegmaria* is a pteridophyte named by Carl Linnaeus.

a. Re-write the scientific name with the author.

(6 Marks)

b. Werner Rothmaler found that the plant given in 'a' (above question) belongs to the genus 'Huperzia' but not to the genus Lycopodium. What is the accepted full scientific name of the plant after the revision? (use Rothm. To denote Werner Rothmaler). (6 Marks)

c. Lastly, Tuhinsri Sen and Udayananda Sen transferred the plant into '*Phlegmariurus*' genus. What is the accepted scientific name of the plant after this transfer? (use T. Sen and U. Sen to denote Tuhinsri Sen and Udayananda Sen respectively) (6 Marks)

d. What is the term used to collectively call all the previous scientific names other than the accepted name?

(6 Marks)

e. *Lycopodium transiens*, *Urostachys phlegmaria* and *Lepidotis phlegmaria* are some of the other scientific names used earlier, apart from *Lycopodium phlegmaria*. Considering the name changes, what is the basionym of the plant out of them? (6 Marks)

f. If the present accepted name of the plant is *Phlegmariurus phlegmaria* (L.) Holub, explain what happened to the scientific name given by Tuhinsri Sen and Udayananda Sen with the possible reason. (10 Marks)

2. Answer both part A and part B

Part A

i. Classification of Angiosperms is based on floral character because;

- (a) Floral parts are more conservative than vegetative parts
- (b) Floral parts are more coloured
- (c) Floral parts are visible
- (d) Floral parts have been preferred over vegetative parts

ii. Chemotaxonomy is connected with;

- (a) Classification of chemicals found in plants
- (b) Use of phytochemical data in systematic botany
- (c) Application of chemicals on herbarium sheets
- (d) Use of statistical methods in chemical-yielding plants

iii. One of the best methods for understanding general relationships of plants is;

- (a) Cytotaxonomy
- (b) Experimental Taxonomy
- (c) Numerical Taxonomy
- (d) Chemotaxonomy

iv. Anatomical features can be used in systematics for:

- (a) The identification of plants.
- (b) Establishing genetic relationships
- (c) Solving taxonomic disputes
- (d) All above

v. Select the incorrect classification system:
(a) The first vegetative
(b) The first floral
(c) It was replaced
(d) The latest

i. How does it differ?

ii. List the features

of the other
ing the name
of them?

ub, explain
en with the
10 Marks)

v. Select the incorrect statement below regarding the Angiosperm Phylogeny Group (APG) classification system.

- (a) The first version of a modern, mostly molecular-based, system of plant taxonomy.
- (b) The first Angiosperm Phylogeny Group was Published in 1998.
- (c) It was replaced by the improved APG II in 2003 and, the APG III system in 2009
- (d) The latest APG system was published in 2018.

(10 marks)

Part B

i. How does plant morphology facilitate classification?

(10 marks)

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ii. List five morphological features used in plant identification and classification.

(15 marks)

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iii. What are the important anatomical characteristics (**mention 5**) of a plant used in systematics?
(10 marks)

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iv. State **one generic name** of a plant endemic to Sri Lanka, that belongs to the following families
(10 marks)

Gentianaceae

Melastomataceae

Areaceae

Balsaminaceae

Gesneriaceae

v. Briefly explain how phylogenetic relationships could be useful in predicting in finding a suitable candidate with a similar phytochemical property when your study group is threatened or extinction.
(15 marks)

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systematics?
(10 marks)

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vi. List five important applications of PCR-based techniques in plant systematics. (10 marks)

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the following
(10 marks)

viii. Mention four developments of plant systematics after the independence from British rule.

(20 marks)

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BACH

SUBJECT: B

COURSE UN

Time: Two h

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(B) Wh

(C) A

1. .

2.

(D)

(E)

3.

i. Write short notes on;

a) Biological classification.

b) Historical background of plant systematics in pre Linnaean era.

(50 marks)

ii. Briefly explain the rules associated with assigning a binomial name for newly discovered plant species according to the International Code of Botanical Nomenclature.

(50 marks)