# UNIVERSITY OF ESWATINI

# 2<sup>ND</sup> SEMESTER 2020/2021

## SUPPLEMENTARY EXAMINATION PAPER

**TITLE OF PAPER:** SYSTEMATICS

**COURSE CODE:** BIO402

**TIME ALLOWED:** THREE (3) HOURS

**INSTRUCTIONS:** 1. ANSWER ANY FOUR (4) QUESTIONS

2. EACH QUESTION CARRIES 25 MARKS

**SPECIAL REQUIREMENTS:** NONE

**THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY**

**THE CHIEF INVIGILATOR**

## QUESTION 1

a) Explain how the terms *systematics* and *taxonomy* are not synonymous. (2 marks)

b) Molecular data may either support or conflict with classifications based on other data. How would you explain this? (2 marks)

c) Will any phylogenetic tree always remain a hypothesis? Explain. (2 marks)

d) Define convergent evolution and give two examples? (3 marks)

e) What are the benefits of systematics in society? (3 marks)

f) Describe four sources of genetic variation? (8 marks)

g) Some characters in the flowers of two species indicate that the species are related, while other characters do not. List some possible examples of each and explain why both types of traits occur. (5 marks)

**Total:** **(25 marks)**

## QUESTION 2
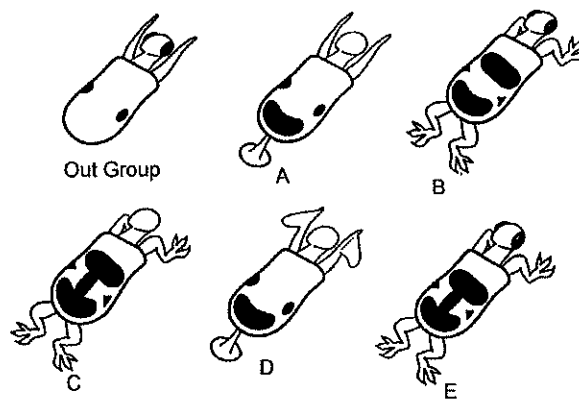


a) Study the organisms in the above picture and make a list of at least eight (8) characters, and their corresponding character states, that you might use to generate a phylogenetic tree of them. (8 marks)

b) Construct the most parsimonious cladogram for the organisms and use bars with the corresponding character numbers, to indicate the synapomorphies of each branch in the cladogram. (10 marks)

c) Construct a dichotomous key for the identification of the organisms. (7 marks)

**Total:** **(25 marks)**

## QUESTION 3

a) Define the biological species concept and list three of its limitations. (4 marks)

b) Define the term *hybrid zone* and explain how it can be viewed as a natural laboratory in which to study speciation. (3 marks)

c) Discuss what might happen in a hybrid zone if interspecific hybrids do not become reproductively isolated from their parent species. (12 marks)

d) With the aid of diagrams, describe the two possible models for the tempo of speciation (6 marks)

Total: **(25 marks)**

## QUESTION 4

Discuss any five structural characters that can be used in plant taxonomy. Illustrate your answer with examples and diagrams where appropriate. (25 marks)

Total: **(25 marks)**

## QUESTION 5

a) Discuss the three ways of defining taxon names under the PhyloCode system of classification. Use diagrams to illustrate your answer. (12 marks)

b) Discuss three of the arguments against the use of ranks in taxonomic classification. (9 marks)

c) Give an example of a specific epithet that refers to i) the morphological feature of the species, ii) the species' geographic range, iii) an ecological feature of the species and iv) the name of a scientist who contributed to the knowledge of a particular geographic region or taxonomic group. (4 marks)

Total: **(25 marks)**

## QUESTION 6

a) Give an example of i) a bracketed dichotomous key and ii) an indented dichotomous key. (4 marks)

b) Discuss four attributes of a good dichotomous key. Illustrate each point with an example. (16 marks)

c) List, in order, the standard components of a plant description. (5 marks)

Total: **(25 marks)**

**END OF EXAMINATION PAPER!**