

UNIVERSITY OF FORT HARE
DEPARTMENT OF ZOOLOGY
SEMESTER EXAMINATIONS: JUNE 2023

ZOOLOGY 212

ZOO 212

TIME: 3 HOURS

120 MARKS

Internal Examiners

Prof. N. Vine
Prof. E. Do Linh San
Dr R. Coetzer
Dr C. Tambling

Instructions to Candidates

IMPORTANT! PLEASE READ CAREFULLY!

All four questions are COMPULSORY.

Answer EACH QUESTION in a DIFFERENT Answer Book.

IT MEANS THAT YOU WILL SUBMIT A TOTAL OF 4 ANSWERS BOOKS.

Number your answers correctly using the same numbers as on the question paper.

Number of pages: 4 including cover

Question 1 (to be answered in the first answer book)

1.1 Using the Harvard referencing style, provide the correct style for the following journal article reference: [5]

Title:	Aquaculture in South Africa: Potential and Pitfalls
Author:	NG Vine & A Onomu
Journal:	Aquaculture Research
Year published:	2021
Start page:	213
End page:	231
Volume:	21
Issue:	3

1.2 Give an example for both a (i) Direct and an (ii) Indirect test which you could use to prove that the shape of the earth is round/spherical. [4]

1.3 It has been claimed that in the wild, kudu calves are born in spring and early summer more than during any other time of the year. Explain what observations you would need to make to determine whether this claim is indeed possibly true (3). What predictive clarity concerns should you consider when conducting the experiment? (2) [5]

1.4 On a recent fieldtrip to near the top of the Hogsback mountains you were tasked with collecting aquatic insects from one of the streams at various altitudes extending down towards Alice. The habitat and water quality is not different between sites but when you check the samples, you noticed that the number of insects seems to decrease as the altitude decreases. You wonder if this is indeed the case and so set out to find an answer.

- a) Clearly identify the co-variables that would need to be tested (2);
- b) Correctly state the null hypothesis (5);
- c) What kind of study is this (hint: it determines what kind and how you phrase your hypothesis)? (1) [8]

1.5 When formulating a hypothesis for anything, it is important that it meets two basic assumptions. What are these assumptions? [2]

1.6 Discuss two uses of spreadsheets. [4]

1.7 Prof Do Linh San, as part of his research on yellow mongoose (a small carnivore), wants to understand whether the yellow mongoose are heavier in areas with more mice and rats and hence more food. [6]

- a. Describe what he may do to determine if this is the case. (2)
- b. What scale of measurement would Prof Do Linh San be taking in his experiment? (1)
- c. Assuming the data has no outliers, describe what summary statistics he could use to easily show possible differences between areas with more and less food. (2)
- d. Describe what graph would be best for visually showing the results. (1)

1.8 List one advantage and one disadvantage of using the mean as a measure of central tendency. [2]

TOTAL 36

Question 2 (to be answered in the second answer book)

- 2.1 A **pyramid of biomass** is a way of representing the mass of organisms in each trophic level of a food chain. Typically, in an ecosystem, we have more producers than consumers. However, in temperate forests, there are more consumers than producers. How would you explain this “paradox”? [3]
- 2.2 Define the following **concepts** used in population ecology/dynamics, and explain why each of these can potentially affect the size of a population: a) natality and mortality; b) emigration and immigration; c) sex ratio; d) age structure. [8]
- 2.3 What do ecologists mean by “**bottom-up**” disturbance in a food chain? Give an example. [4]
- 2.4 Name and briefly explain **five main types of interactions** that exist between species. Give an example (involving a pair of species) for each of these interactions. [15]

TOTAL 30

Question 3 (to be answered in the third answer book)

- 3.1 The topic of Evolution is a contentious one to the general public. There are, however, several lines of evidence in support of Evolution. Describe four lines of evidence supporting Evolution. [8]
- 3.2 Several modes of speciation are known to affect the process of speciation. Explain the difference between **allopatric** and **sympatric** speciation. [6]
- 3.3 Population genetics is an important branch of Evolutionary Biology, and forms an important tool during Conservation biology research. Discuss the three main goals of Population Genetics. [6]
- 3.4 Suppose a population of 1320 springbok located in a Kalahari nature reserve, consists of 725 individuals for a dominant genotype BB, 455 individuals for Bb, and 140 individuals for the recessive bb genotype. Calculate the following measures: (**Show your calculation steps and round all fractions to two (2) decimals for all answers**) [10]
- What are the allele frequencies of B and b? (2)
 - Calculate the expected number of individuals for each genotype under Hardy-Weinberg law. Round your answer up to closest whole number. (3)
 - Given that $df = 1$; $p\text{-value} = 0.05$; critical value = 3.84, is this population in Hardy-Weinberg Equilibrium? Show your Chi square (X^2) calculations. (5)

TOTAL 30

Question 4 (to be answered in the fourth answer book)

- 4.1 During his PhD, Dr Tambling noticed that lions in the Kruger National Park learnt to chase giraffe across roads. This behaviour resulted in giraffe's slipping on the roads and falling which made it easier for the lions to kill the giraffe. Explain which two learning models the lions could be using to learn this behaviour? [4]
- 4.2 Many male birds have extravagant secondary sexual characteristics (i.e. long tails, bright plumage etc.). Explain how sexual selection and natural selection drive the development and maintenance of these extravagant characteristics. [6]
- 4.3 What is the difference between a proximate question and an ultimate question in animal behaviour studies. [2]
- 4.4 Discuss two different sensory types in animals. [4]
- 4.5 Contrast the three forms of polygynous mating systems. [6]
- 4.6 What do behavioural geneticists try to understand? [2]

TOTAL 24