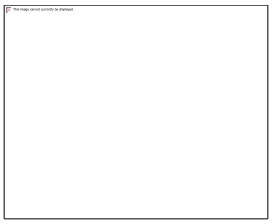

JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF AGRICULTURAL AND FOOD SCIENCES

FOURTH YEAR SEMESTER ONE EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN ANIMAL SCIENCE

2023/2024 ACADEMIC YEAR

SIAYA

COURSE CODE: AAB 1313

COURSE TITLE: Quantitative genetics

DATE: **TIME:**

TIME: 2 HOURS

Instructions:

1. **Answer ALL questions in Section A and TWO questions in Section B.**
2. **Candidates are advised NOT to write anything on this question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

SECTION A [30 MARKS]

Answer ALL questions from this Section.

Questions 1

a) Define the term quantitative genetics. (1 mark)
b) Explain the importance of quantitative genetics to animal breeding. (2 marks)
c) Present a schematic model of phenotypic variance of a trait and explain its components. (3 marks)
d) From the model in 1(c) above, derive the following parameters:
   i. Heritability in the narrow sense. (1 mark)
   ii. Heritability in the broad sense. (1 marks)
   iii. Repeatability. (2 marks)

Question 2

Differentiate between the following:
a) Selection differential and selection intensity. (2 marks)
b) Single trait selection and multiple trait selection. (2 marks)
c) Heterosis and inbreeding coefficient. (2 marks)
d) Within family selection and between family selection. (2 marks)
e) Collateral relative and progeny. (2 marks)

Question 3

Given the following data on daily gain of beef cattle:

	Daily gain (kg)
Overall mean	0.25
Mean of selected males	2.00
Mean of selected females	0.75

Calculate the following:
a) Selection differential among males. (1 mark)
b) Selection differential among females. (3 mark)
c) Average selection differential for the herd. (3 mark)
d) Average selection differential if there was no selection (3 marks)
e) Among females, i.e. if selection differential among females was 0. (3 marks)

SECTION B [40 MARKS]

Answer ANY two questions from this Section

Question 4

Write short note on the following:

a) Correlated traits. (4 marks)
b) Repeatability. (4 marks)
c) Tandem selection. (4 marks)
d) Backcrossing. (4 marks)
e) Indirect selection. (4 marks)

Question 5

Discuss the principle of family selection as applied animal breeding. (20 marks)

Question 6

Discuss the three methods of multiple trait selection. (20 marks)

Question 7

Discuss the importance of crossbreeding as a tool for the genetic improvement of livestock. (20 marks)