



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY  
SCHOOL OF AGRICULTURAL AND FOOD SCIENCES  
UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE IN  
ANIMAL SCIENCE**

**THIRD YEAR FIRST SEMESTER 2017/2018 ACADEMIC YEAR**

**REGULAR**

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**COURSE CODE: AAS 3317**

**COURSE TITLE: QUANTITATIVE GENETICS**

**EXAM VENUE:LR 5**

**STREAM: BSc. (Animal Science)**

**DATE: 14/12/17**

**EXAM SESSION: 9.00 – 11.00 AM**

**TIME: 2.00 HOURS**

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**Instructions:**

- 1. Answer ALL question in Section A (compulsory) and ANY other TWO questions in Section B.**
- 2. Candidates are advised not to write on the 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.**

1. a) Using five (5) known comparisons, distinguish between qualitative and quantitative traits. (5 marks)
- b) Repeatability is greater than heritability in the broad sense, which in turn is greater than heritability in the narrow sense. Explain. (3 marks)
- c) Differentiate between heterosis inbreeding depression. (2 marks)
2. Present the phenotypic variance model of a quantitative trait and describe its components. (10 marks)
3. Explain the following terms in the context of quantitative genetics:
  - a) Most Probable Producing Ability. (2 marks)
  - b) Breeding value. (2 marks)
  - c) Genotypic value. (2 marks)
  - d) Pleiotropy. (2 marks)
  - e) Common environmental effect. (2 marks)

**[SECTION B      40 MARKS]**

**Answer ANY TWO Questions from this Section.**

- 4 a) What is family selection? (3 marks)
- b) State the two main family lines and explain, giving examples, how they occur. (8 marks)
- c) What are the limitations of family selection. (6 marks)
- d) Under what conditions is family section recommended? (3 marks)
5. a) Give the formula for predicting genetic gain per year. How is genetic gain affected by heritability, intensity of selection and phenotypic variance? (8 marks)
- b) Given the following information on selection for fleece production (kg.) in sheep:  
Heritability = 0.60; Phenotypic variance = 0.81<sup>2</sup> kg; Selection differential:  
Males = 0.162; females = 0.972; Generation interval (years): males = 3.5 and females = 2.8.
  - i. Compute expected genetic gain per year. (4 marks)
  - ii. Suppose there was no selection among females, what would be the genetic gain per year. (5 marks)
  - iii. Comment on your results. (3 marks)
6. Write short notes on the following:
  - a) Pleiotropy. (4 marks)
  - b) Selection limit. (4 marks)
  - c) Temporary environmental effect. (4 marks)
  - d) Dominance effect. (4 marks)
  - e) Correlated response. (4 marks)