



# **MAASAI MARA UNIVERSITY**

**REGULAR UNIVERSITY EXAMINATIONS**

**2023/2024 ACADEMIC YEAR**

**SECOND YEAR FIRST SEMESTER**

**SCHOOL OF NATURAL RESOURCES & ANIMAL  
SCIENCES**

**BACHELOR OF SCIENCE IN ANIMAL HEALTH  
AND PRODUCTION**

**COURSE CODE: AHP 2106-1**

**COURSE TITLE: ANIMAL GENETICS AND  
BREEDING**

**DATE: 11/12/2023**

**TIME: 0830-1030 HRS**

---

**INSTRUCTIONS:**

- (i) *Attempt ALL the questions*
- (ii) *Label your answers clearly*
- (iii) *Don't mix up answers*
- (iv) *DO NOT WRITE anything on the question paper*

### Question 1

I) Define the following terms in animal genetics and breeding (7 marks)

- (i) Gene
- (ii) Locus
- (iii) Dominant allele
- (iv) Recessive allele
- (v) Heterozygous
- (vi) Additivity
- (vii) Epistasis

II) The phenotype of an animal is dependent on the genotype, thus, comment on the following statement (6 marks)

- (i) GG animals weigh 40 kg, Gg animals 38 kg and gg animals 36 kg.
- (ii) GG animals weigh 40 kg, Gg animals 42 kg and gg animals 36 kg.

III) State seven (7) characteristics of animal breeding program in animal genetics and breeding (7 marks)

### Question 2

Describe heterosis (20 marks)

### Question 3

- (i) Define the term "Phenotype". State the components of phenotypic variation. (10 marks)
- (ii) Define the following terms giving three (3) examples (10 marks)
  - i. Qualitative traits
  - ii. Quantitative traits

### Question 4

- (i) What is selection in animal genetics? (5 marks)
- (ii) State any five (5) principles of selection criterion (5 marks)
- (iii) Using a formula, define selection intensity (10 marks)

### Question 5

Suppose that in a population of beef cattle the phenotypic variance for rib eye area length is 2.5 and the slope of the father – offspring regression for this trait is 0.2. From a long-term captive population, you also have data from a line of completely inbred individuals. In this line the phenotypic variance among individuals is 0.50. (20 marks)

- (i) What is the total genetic variance for eye rib length? (5 marks)

- (ii) What is the environmental variance? (5 marks)
- (iii) What is the heritability ( $h^2$ )? (5 marks)
- (iv) What is the additive genetic variance? (5 marks)

### Question 6

- (i) Define the following terms used in animal genetics and breeding (4 marks)
  - a. Population genetics
  - b. Hardy-Weinberg Principle
- (ii) The frequency of the following genotypes MM, Mn and nn in a given population is as follows: MM = 180, Mn = 240 and nn = 80. Calculate the allele frequency in the population shows you calculation (10 marks)
- (iii) State the conditions under which the gene pool in a population is in equilibrium (6 marks)

/END/