

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF CERTIFICATE IN ANIMAL HEALTH AND PRODUCTION

ANSC 00141: GENETICS AND ANIMAL BREEDING

STREAMS: CERT (ANIMAL HEALTH) Y1S2

TIME: 2 HOURS

DAY/DATE: FRIDAY 8/12/2017

11.30 A.M - 1.30 P.M.

INSTRUCTIONS:

- This examination has TWO Sections, A and B
- Attempt ALL Questions in Section A and TWO Questions in Section B
- Mobile phones are NOT ALLOWED in the examination room

SECTION A: ATTEMPT ALL QUESTIONS. [40 MARKS]

QUESTION ONE

Define the following terms

- (a) Trait
- (b) Genotype
- (c) Gene
- (d) Heterosis

[10 Marks]

QUESTION TWO

Seed color in Garden peas is determined by a single locus with two alleles G and g. Allele G is dominant over g. GG seeds are green and gg are yellow.

- (a) Using a Punnet Square, determine the genotype and phenotype ratios in F₁ generation of the following cross.

Gg x gg

[7 Marks]

- (b) Differentiate between co-dominance and partial dominance.

[3 Marks]

QUESTION THREE

Cell division is necessary for growth in animals.

- (a) Describe the interphase stage of cell division.
- (b) Differentiate between recombination and cytokinesis.

[5 Marks]

[5 Marks]

QUESTION FOUR

DNA acts as the hereditary material in animals.

- (a) Given the following as DNA template for mRNA synthesis, determine the complementary mRNA sequences

AAATTTCCCGGG [2 Marks]

- (b) Differentiate between transcription and translation. [5 Marks]

- (c) Name the three types of RNA found in cattle. [3 Marks]

SECTION B: ATTEMPT ANY TWO QUESTIONS [30 MARKS]

QUESTION FIVE

The table below relates a population with a locus A. The locus has the alleles A and a.

Genotype	AA	Aa	Aa
Number of individuals	400	320	280

- (a) Determine the gene and genotype frequencies for this population. [6 Marks]
 (b) State the Hardy-Weinberg law [1 Mark]
 (c) Explain any four factors causing changes in gene frequencies in a population. [8 Marks]

QUESTION SIX

The following parameters relate to the trait milk yield in cattle

$$h^2 = 0.30; \sigma_A^2 = 12,500 \text{ kg}^2; \text{Population mean} = 2,500 \text{ kg.}$$

- (a) Determine the phenotypic variance for the population. [3 Marks]
 (b) Estimate the breeding value for a cow with a lactation milk yield of 3,000 kg in this population. [5 Marks]
 (c) A breeding program for the population selects cows with an intensity of 0.644. Determine the selection differential in the cows. [7 Marks]

QUESTION SEVEN

Inbreeding results due to mating of genetic related individuals.

- (a) Discuss any two detrimental consequences of inbreeding. [4 Marks]
 (b) Discuss any two consequences of crossbreeding. [4 Marks]
 (c) Distinguish between the terms coefficient of kinship and additive genetic relationship. [4 Marks]
 (d) Define the term mating. [3 Marks]

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