# CHUKA UNIVERSITY

## UNIVERSITY EXAMINATIONS

### EXAMINATION FOR THE AWARD OF DIPLOMA IN ANIMAL HELATH AND PRODUCTION

**ANSC 0241: GENETICS AND ANIMAL BREEDING**

**STREAMS: DIP. ANHE** **TIME: 2 HOURS**

**DAY/DATE: WEDNESDAY 07/8/2019** **2.30 P.M. – 4.30 P.M.**

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**INSTRUCTIONS:**

- **This examination has two sections, Section A and B**
- **Answer ALL questions in section A and TWO questions in section B**

### SECTION A (30 MARKS)

1. Differentiate the following concepts as used in animal breeding
   (a) Selection and mating
   (b) Trait and phenotype
   (c) Heterosis and breeding value [8 marks]
2. (a) State the Hardy Weinberg law [ 2 marks]
   (b) Explain the factors that disrupt the Hardy-Weinberg equilibrium in a population [10 marks]
3. Seed color in garden peas in determined by a single locus with two alleles *G* and *g*. *GG* seeds are yellow, *Gg* are yellow and *gg* are green. A test cross among these seeds gave an F1 generation with the following phenotypic frequencies:

   Yellow : Green
   3 : 1

   Deduce possible genotypes of the parentals? [6 marks]

4. Using diagrams show the difference between a ribose and a deoxyribose sugars [4 marks]

## SECTION B (40 MARKS)

5. The trait skin color in short horn cattle is determined by a single locus with two alleles. Animals with the genotype BB are black, those with the genotype Bb are tan and those with genotype bb are white

(a) State the gene interaction at this locus? [2 marks]

(b) The table below presents the frequency of phenotypes in a population of short horn cattle:

| Phenotype | Black | Tan | White |
|---|---|---|---|
| No. of individuals | 7,500 | 3,500 | 1,500 |

(i) Calculate the genotype frequencies for this population [6 marks]

(ii) Calculate the allele frequencies for this population [9 marks]

(c) Distinguish between categorical and continuous traits [3 marks]

6. (a) Using a diagram illustrate the structure of a nucleotide [10 marks]

(b) The frequency of the allele $A_1$ in a population is denoted by the letter $p$ and that for the allele $A_2$ by $q$. assuming that the population is in Hardy-Weinberg equilibrium, determine the possible genotypes and their frequencies in the population. [10 marks]

7. (a) Distinguish between heritability in the narrow sense and heritability in the broad sense. [4 marks]

(b) The mean weaning body weight in Galla goat is 10.34 kg per lactation. A buck weighing 12.5 kg was mated with a doe weighing 10.5 kg. If the heritability of weaning weight is 0.25, determine the expected weaning weight of their offspring. [6 marks]

(c) Estimate the accuracy with which you have determined the weaning weight of the offspring from question 9b above. [4 marks]

(d) Explain any 3 reasons for cross-breeding. [6 marks]