CHUKA **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF CERTIFICATE IN ANIMAL HEALTH AND PRODUCTION

ANSC 00141: BASIC ANIMAL GENETICS AND BREEDING

STREAMS: CERT (ANHP) Y1S2 **TIME: 2 HOURS**

DAY/DATE: MONDAY 08/04/2024 **8.30 A.M – 10.30 A.M.**

INSTRUCTIONS:

- **Attempt ALL questions in SECTION A and TWO questions in SECTION B.**
- **Do NOT write on the question paper.**
- **Use illustrations where necessary**

SECTION A: 40 MARKS

QUESTION ONE

(a) Differentiate between phenotype and genotype as used in animal breeding and genetics (2 marks)

(b) Briefly describe the role of genetics in animal improvement. (2 marks)

(c) Half sib individuals are those having? (1 mark)

(d) Enumerate trait of economic importance in a dairy cow. (2 marks)

(e) The term breading value is a very important measure in determining the genetic superiority of individuals, define the term giving its important. (2 marks)

(f) Briefly enumerate the difference between meiosis and mitosis. (2 marks)

(g) Define heritability giving the types of heritability. (2 marks)

(h) Outline the causes of genetic shuffling in meosis cell division. (2 marks)

(i) The term ‘factor’ was first coined by? (1 mark)

(j) Using a diagram describe the Double helix of DNA structure. (4 marks)

(k) Describe briefly constraints affecting adoption of reproductive technologies. (2 marks)

(i) Differentiate between selection intensity and selection differential. (2 marks)

(m) Milk production is very important trait for dairy cows, how will this trait be evaluated in bulls. (1 mark)

(n) State effects of inbreeding in livestock production. (2 marks)

(o) Give the nitrogenous base present in DNA but not in RNA molecule. (1 mark)

(p) Outline the portioning of genotypic variance giving its mathematical representation. (2 marks)

(q) State the Mendel's laws of inheritance. (3 marks)

(r) State the reasons of applying crossbreeding systems in animal breeding to improve population. (2 marks)

(s) Outline the components of interphase of cell cycle. (3 marks)

(t) Nucleotide is a building block for DNA state its components. (2 marks)

SECTION B: (30 MARKS)

QUESTION TWO

(a) Describe one reproductive technology used in animal production improvement. (5 marks)

(b) The table below presents data on milk production in (litres) of 10 dairy cows taken after milking

Cow	1	2	3	4	5	6	7	8	9	10
Milk Production	20	15	17	12	20	6	8	9	18	9

Use the above data to calculate

(i) Mean milk production for the cows (1 mark)
(ii) Variance for the milk production (3 marks)
(iii) Standard deviation for the milk production (1 mark)
(iv) Coefficient of variance for the milk production (1 mark)
(v) Assume the heritability for the milk production is $h^2 = 0.6$, calculate the breeding value for cow number 2 (2 marks)

(vi) Assumed that cow number 2 was a male and cow number 6 a female, calculate the expected breeding value (EBV) of their progeny. (2 marks)

QUESTION THREE

(a) Describe Hard-Weinberg assumptions that may cause genetic structure to change. (5 marks)

(b) Chuka University farm keeps rabbits for demonstrations purposes. A study on blood types in the population found the following genotypic distribution among the rabbits sampled: 1300 were BB, 1450 were Bb and 250 were bb. Calculate:

(i) The genotypic frequencies (3 marks)
(ii) The allele frequencies (3 marks)
(iii) Determine whether this population is in Hardy-Weinberg Equilibrium given that the frequency for blood type $p(B) = 0.7$ and $q(b) = 0.3$. (4 marks)

QUESTION FOUR

(a) Determine the appearance of (a) F1 and (b) F2 progenies when a pure (homozygous) polled cow is crossed with pure (homozygous) horned cow. Give the genotypic and phenotypic ratios. (5 marks)

(b) Proteins plays a key role in the growth and development, briefly describe process of protein synthesis. (5 marks)

(c) Briefly describe different methods of animals selection used in animal improvement. (5 marks)
