

**CHUKA**



**UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURE EXTENSION AND DEVELOPMENT, BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION, BACHELOR OF SCIENCE IN FOOD SCIENCE AND TECHNOLOGY AND BACHELOR OF SCIENCE IN AGRICULTURE**

**BOTA 111/102: GENERAL GENETICS**

**STREAMS: B.SC. (AGED, FOST AND AGRI) Y1S2**

**TIME: 2 HOURS**

**DAY/DATE: TUESDAY 09/04/2019**

**8.30 A.M. – 10.30 A.M.**

**INSTRUCTIONS:**

- Answer ALL questions in section A and any TWO questions in section B.
- Do not write anything on the question paper.
- Use illustrations where appropriate to enhance your answers.

**SECTION A (30 MARKS)**

- (a) A rabbit has a pure white coat:

  - Give its possible genotype
  - Give its phenotype in one word
- (b) Using the Punnet square method, show the genotypes of the  $F_2$  offspring obtained from a cross between it and another rabbit homozygous for the wild type allele. (3 marks)
- (c) Write the phenotypic ratio of the offspring in 1(b) above. (1 mark)
- (a) Show the alleles of the gene that controls human blood types. (1  $\frac{1}{2}$  marks)

(b) Giving an example of each, distinguish between sex-linked alleles and sex-influence dominance. (3 marks)

(c) Indicate the horn condition of the following offspring between a Dorset and a Suffolk sheep.

(i) Male,  $\begin{matrix} +\overset{i}{h} \\ +\overset{i}{h} \\ h^i \end{matrix}$

(ii) Female,  $\begin{matrix} +\overset{i}{h} \\ h^i \end{matrix}$

(iii) Female,  $\begin{matrix} +\overset{i}{h} \\ hh^i \end{matrix}$

3. (a) The DNA of cells of a certain species, was found to contain 26.3% adenine. What was the value of the other bases? (3 marks)

(b) Describe briefly the events of the mitotic prometaphase. (3 marks)

4. The figure bellow depicts the karyotype of a human cell.

(i) Deduce any genetic disorder the person may suffer from. (1 mark)

(ii) Give the reason for your judgment in (i) above. (1 mark)

(iii) Attempt an explanation of how the person ended up having this chromosomal constitution. (4 marks)

5. In a population of waterbucks, 920 are homozygous for the dominant allele **W**. Twice this number are heterozygotes while 885 are homozygotes of the recessive allele.

(a) Calculate the allele frequency of the dominant allele. (3 marks)

(b) Calculate the genotype frequency of **Ww**. (3 marks)

**SECTION B (40 MARKS)**

6. Discuss sex determination in the following organisms:
- (i) Man (8 marks)
  - (ii) Drosophila (12 marks)
7. Citing examples from two domesticated animals, write an essay on lethal genes. (20 marks)
-