



UNIVERSITY EXAMINATIONS

SECOND SEMESTER 2023/2024 ACADEMIC YEAR

**FIRST YEAR EXAMINATION FOR THE DEGREES OF
BACHELOR OF SCIENCE (AGED)**

BOTA 113: GENERAL GENETICS

STREAM: R

TIME: 2 HRS

DAY: WEDNESDAY [2.30P.M - 4.30P.M]

DATE: 10/04/2024

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

INSTRUCTIONS:**Answer all questions in Section A and any TWO questions in Section B****SECTION A: 40 MARKS****QUESTION ONE**

Provide the relevant term to complete the statement

(5 Marks)

- a) A case of structural mutation that leads to position effect is a _____
- b) A nullisomic is an example of _____.
- c) The mode of sex determination found in bees is called _____
- d) A couple is both of blood group AB. Blood types of their children are _____
- e) One of the modifications of the 9.3.3.1 phenotypic ratios are 9:7. The epistasis is called _____

QUESTION TWO

Describe the activities that are involved in the DNA replication process.

(4 Marks)**QUESTION THREE**

Explain the events at the interphase period of a cell cycle.

(5 Marks)**QUESTION FOUR**

a) What is polyploidy?

(1 Mark)

b) Briefly discuss how polyploids are formed.

(4 Marks)**QUESTION FIVE**

a) Describe briefly the four types of chromosomes based on the centromere position on the chromosome.

(4 Marks)

b) Name any four mutagens that can affect the genetic material in a cell.

(2 Marks)**QUESTION SIX**

a) Define the Hardy-Weinberg principle (Law of Equilibrium). What are its five assumptions?

(6 Marks)

b) In a certain population, the Genotype frequency of aa was reported at 20%. What are the frequencies of

i) Genotypes AA and Aa

(2 Marks)

ii) Alleles A and a

(2 Marks)

QUESTION SEVEN

Ten male Year 1 Laikipia University students were weighed in 2023. The following were the weights

(Kgs): 51, 69, 69, 57, 61, 57, 75, 85, 69, and 63. Calculate; **(5 Marks)**

- The mean weight of the sampled students.
- The variance of their weight.
- The standard deviation of their weight.
- The standard error of the mean for these weights.

SECTION B: 30 MARKS**QUESTION EIGHT**

Discuss the structural chromosomal mutation. **(15 Marks)**

QUESTION NINE

In Mouse, fur colour shows incomplete dominance with a cross between pure breeding black and pure breeding white colored mice producing grey colored offspring's. Likewise absence or presence of earlobes shows complete dominance in which lobed ear is dominant to nonlobed condition. If grey colored mice that are heterozygous for earlobes characteristic are crossed,

- What will be the phenotypes and genotypes of their offsprings?
- Show all the F₂ genotypes, gametes and phenotypes and work out the crosses.
- Give the phenotypic ratio of these offsprings. **(15 Marks)**

QUESTION TEN

In an isolated mountain village, the gene frequencies of I^A, I^B and I^O alleles are 0.95, 0.04 and 0.01, respectively. If the total population is 424, calculate the number of individuals with O, A, B and AB type blood. **(15 Marks)**

