



MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

**FIRST YEAR FIRST SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE (AGRICULTURAL EDUCATION AND EXTENSION)
SBC 120: INTRODUCTION TO GENETICS**

DATE:

TIME :

INSTRUCTIONS

1. Answer Question 1 (compulsory) and **any two** questions in Section B.
2. Use clean well labelled diagrams wherever appropriate.

SECTION A (COMPULSORY)

QUESTION ONE (30 MARKS)

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|----|--|-----------|
| a) | Explain the following terms used in population genetics | (3 marks) |
| | i. Microevolution | |
| | ii. Population | |
| | iii. Gene pool | |
| b) | Differentiate between a homozygous and a heterozygous individual | (3 marks) |
| c) | Describe the law of segregation as applied in Mendelian genetics | (3 marks) |
| d) | Explain the additive gene action in organisms | (3 marks) |
| e) | Explain scenarios under which epistasis occurs | (3 marks) |
| f) | Explain three main types of natural selection | (3 marks) |
| g) | Describe environmental sex determination in organisms | (3 marks) |
| h) | Explain how nonrandom mating affects genetic equilibrium in a population | (3 marks) |
| i) | Describe parthenogenesis in insects | (3 marks) |
| j) | Explain the methods used to study genetics | (3 marks) |

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION TWO (20 MARKS)

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|----|---|------------|
| a) | Explain how the study of genetics has helped to improve agriculture | (10 marks) |
| b) | Describe five Intragenic interactions that can occur in organisms | (10 marks) |

QUESTION THREE (20 MARKS)

- a) Describe the principle of independent assortment by Mendel (10 marks)
- b) Using appropriate examples describe Dominant Inhibitory gene action (10 marks)

QUESTION FOUR (20 MARKS)

- a) A normal woman whose father was Hemophilic marries a normal man whose father was also Hemophilic. The couple has a Hemophilic daughter with normal complement of chromosomes. Is infidelity suspected? Explain your answer. (10 marks)
- b) Describe five chromosomal sex-determination systems. (10 marks)

QUESTION FIVE (20 MARKS)

Describe conditions that can keep populations from establishing or maintaining genetic equilibrium.