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 IN AGRICULTURAL EDUCATION AND EXTENSION

SBC 120: INTRODUCTION TO GENETICS

DATE: 3/2/2022 **TIME: 8.30-10.30 AM**

INSTRUCTIONS

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

SECTION A

QUESTION ONE (30 MARKS)

a) Differentiate the following terms (3 marks)

   i. Genotypic frequency

   ii. Phenotypic frequency

b) Describe the law of segregation as applied in Mendelian genetics (3 marks)

c) Explain the significance of a test cross in genetics (3 marks)

d) Explain scenarios under which epistasis occurs (3 marks)

e) Explain three main types of natural selection (3 marks)

f) Differentiate between additive and non-additive gene action (3 marks)

g) Explain how nonrandom mating affects genetic equilibrium in a population (3 marks)

h) Describe parthenogenesis in insects (3 marks)

i) Explain how temperature help to determine sex of organisms (3 marks)

j) In his experiments, John crossed maize plants and obtained a ratio of 2: 1 instead of the expected 3: 1 explain the possible reasons. (3 marks)

SECTION B

QUESTION TWO (20 MARKS)

a) Explain the use of genetic studies in medicine. (10 marks)

b) Describe the following linkages.

i. Y- linked traits (3 marks)

ii. Sex limited traits (3 marks)

iii. Sex influenced genes (4 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) Explain how selection affect the genetic composition of a population. (10 marks)

QUESTION FIVE (20 MARKS)

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