



MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR BACHELOR OF EDUCATION (SCIENCE)

SBT 401: GENERAL GENETICS

DATE: 13/12/2017

TIME: 2.00-4.00 PM

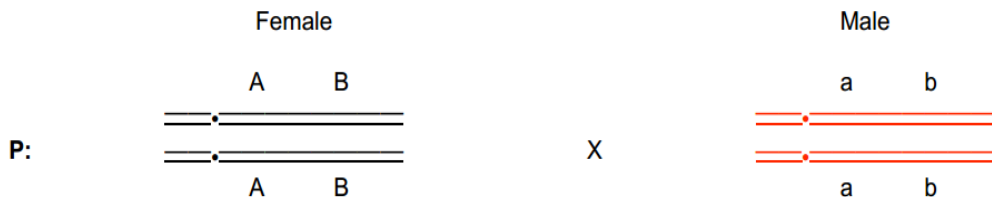
INSTRUCTIONS

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

SECTION A

QUESTION ONE (30 MARKS)

- a) Explain the importance of multiple allelism (3 marks)
- b) Explain how the light purple aleurone colour in maize comes about (3 marks)
- c) Using an example, explain pleiotropy (3 marks)
- d) Explain the following terms as used in genetics (3 marks)
 - i. Phenocopies
 - ii. Linked genes
 - iii. Discontinuous traits
- e) Describe how interactions between nuclear and cytoplasmic genomes occur (3 marks)
- f) Consider a case where two genes A and B are linked. What gametes would be produced by F1 in case there's a crossing over



(3 marks)

- g) Outline three sources of genetic variation (3 marks)
- h) Outline the causes of genetic drifts (3 marks)
- i) State the Hardy-Weinberg equilibrium (3 marks)
- j) Draw a graph showing continuous variation of height in a population (3 marks)

SECTION B

QUESTIONS TWO (20 MARKS)

Discuss the mechanisms of gene interactions in organisms (20 marks)

QUESTION THREE (20 MARKS)

- a) Discuss the theories of multiple allelism (16 marks)
- b) Illustrate existence of multiple alleles in humans (4 marks)

QUESTION FOUR (20 MARKS)

Assess the ways in which genetic variance affects evolution of populations (20 marks)

QUESTION FIVE (20 MARKS)

Draw a genetic map of LGS genes (order unknown) which confer the following traits in maize?

Maize:

- l l - lazy or prostrate growth
- g g - glossy leaves
- s s - sugary endosperm

Triple Heterozygote: **L G S / l g s** X Recessive homozygote: **l g s / l g s**

Progeny Phenotype	Genotypes of offspring	Number
Wildtype	L G S / l g s	286
Lazy	l G S / l g s	33
Glossy	L g S / l g s	59
Sugary	L G s / l g s	4
Lazy, Glossy	l g S / l g s	2
Lazy, Sugary	l G s / l g s	44
Glossy, Sugary	L g s / l g s	40
Lazy, Glossy, Sugary	l g s / l g s	272
Total		740

(20 marks)