

GWANDA STATE UNIVERSITY



FACULTY OF LIFE SCIENCES

DEPARTMENT OF CROP SCIENCE

BACHELOR OF SCIENCE HONOURS DEGREE IN CROP SCIENCE

LCS 2108 GENETICS AND PLANT BREEDING

FIRST SEMESTER EXAMINATION

JUNE 2020

This examination paper consists of 3 pages

Time Allowed: 3 hours
Total Marks: 100
Special Requirements: None
Examiner's Name: Dr. T Goche

INSTRUCTIONS

1. Answer **all** questions in Section A
2. Answer **only two** questions in Section B

MARK ALLOCATION

QUESTION	MARKS
SECTION A	60
SECTION B	40
TOTAL ATTAINABLE MARKS	100

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SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

1. a) Give a brief description of a chromosome. (4)
- b) Explain the chromosome theory of inheritance, highlighting its relationship with meiosis and Mendel's laws. (10)
- c) i) State the Hardy-Weinberg law. (2)
- ii) What factors may cause departure of a population from equilibrium. (4)

2. a) Giving examples where necessary, explain the following terms/concepts:
 - i) Dihybrid cross (2)
 - ii) Heterosis (2)
 - iii) Inbreeding depression (2)
 - iv) Gene pool (2)
- b) Distinguish between:
 - i) Autogamy and allogamy (2)
 - ii) Dominant and recessive allele (2)
 - iii) Qualitative and quantitative traits (2)
- c) Explain how polyploidy has been exploited in agriculture using specific examples to illustrate your answer. (6)

3. a) Define natural and artificial selection. (5)
- b) With the aid of well labelled diagrams, explain stabilising, directional and disruptive selection. (15)

SECTION B: ANSWER ANY TWO QUESTIONS IN THIS SECTION

4. a) List the differences between mitosis and meiosis. (10)
- b) What are the essential features of meiosis and what role do they play in crop improvement. (5)
- c) How does vegetative propagation differ from apomixis. (5)
5. Discuss the use of molecular genetic markers in plant breeding. (20)
6. Explain how a plant breeder can introduce genetic variation to a breeding program. (20)
7. A plant breeder made a monohybrid cross and he expected to see a phenotypic ratio of 3:1. He observed 215 plants to be resistant and 85 plants to be susceptible out of 300 plants he planted. Use chi-square to prove whether what he observed is what he was expected to see. Draw up hypothesis and valid conclusion. (20)

END OF EXAMINATION PAPER