



GWANDA STATE UNIVERSITY
FACULTY OF LIFE SCIENCES
DEPARTMENT OF CROP SCIENCE
BACHELOR OF SCIENCE (HONOURS) DEGREE IN CROP SCIENCE

LCS 4209 CROP BREEDING

SECOND SEMESTER EXAMINATION

JUNE 2023

This examination paper consists of 3 pages.

Time Allowed: 3 hours.

Total Marks: 100

Special Requirements: None

Examiner's Name: Mr J.Dube

INSTRUCTIONS

1. Answer ALL questions in Section A
2. Answer 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 SECTION A

1. a) Harlan proposed that crops may have originated in centres and non-centres of origin. Giving examples, define the following terms:
- i) Centre (3)
 - ii) Non-centre. (3)
- b) Justify the importance of crop breeding in Zimbabwe (8)
2. a) Distinguish between a genotype and a phenotype. (2)
- d) Using examples distinguish between the following plant breeding concepts:
- i. Natural selection and artificial selection (4)
 - ii. In situ-germplasm conservation and ex-situ germplasm conservation (4)
2. a) i) What causes deviations from the Hardy Weinberg Equilibrium? (5)
- iii) Give advantages and limitations of pure line breeding. (6)
- b) In a dihybrid cross, a pea plant with a dominant round and green seeds (RRGG) was cross bred with another pea plant with a recessive wrinkled and yellow seeds (rrgg) in year one to produce a heterozygous individual. Using a punnet square, demonstrate how the dihybrid ratio was derived in the F₂ generation. (10)
3. a) With the aid of a well labelled diagram describe the four stages that occur during mitosis following their order of occurrence (12)
- b) Identify any 3 causes to variations in plants (3)

SECTION B: ANSWER TWO QUESTIONS IN SECTION B

4. Demonstrate fully your understanding on the population improvement procedure of backcrossing using a dominant trait for Disease Resistance (RR). (20)
5. a) What are the four considerations made when selecting a molecular marker? (4)
- b) Genetic engineering involves the manipulation of genes within the plant species which may further involve the transfer of genes. Discuss any advantages and disadvantages of Genetically Modified Organisms (GMOs) (16)
6. a) Describe any two Plant Breeders' Rights according to [Chapter 18:16] of the Act.(4)
- b) What do you understand from the terms: genotype x environment interaction? (8)
- c) Discuss gene interactions under the following subheadings:
- i. Allelic interactions (4)
 - ii. Non-Allelic interactions (4)
7. a) Outline the procedure followed in Mass selection stating the advantages and disadvantages of mass selection. (12)
- b) Write short notes on the following
- i. gene penetrance and gene expressivity (4)
 - ii. Qualitative and quantitative traits (4)

END OF EXAMINATION PAPER

