



**GWANDA STATE UNIVERSITY**  
**FACULTY OF LIFE SCIENCES**  
**DEPARTMENT OF CROP SCIENCE**  
**BACHELOR OF SCIENCE (HONOURS) DEGREE IN CROP SCIENCE**  
**LCS 4108 CROP BREEDING AND BIOTECHNOLOGY**  
**FIRST SEMESTER EXAMINATION**  
**FEBRUARY 2022**

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**

<b>QUESTION</b>	<b>MARKS</b>
SECTION A	<b>60</b>
SECTION B	<b>40</b>
<b>TOTAL ATTAINABLE MARKS</b>	<b>100</b>

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**SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION**

1. a) Harlan proposed that crops may have originated in centres and non-centres.  
Giving examples, define the terms i) centre ii) non-centre. (6)
- b) What are the consequences of insufficient genetic diversity (6)
- c) Define environmental and hereditary variations. (2)
- d) Explain how heritable variations originate in nature. (3)
2. a) i) Highlighting the differences, describe how three-parent populations and backcross populations are formed. (8)
- ii) Describe the advantages of a complex cross versus a single cross. (4)
- iii) Explain the advantages and limitations of pure line breeding. (6)
- b) Describe the characteristics of the following cultivars
- i) Open pollinated (3)
- ii) Synthetic (3)
- iii) Multi-line (2)
- iv) F1 (2)
- v) Pure line (2)
3. a) i) What are haploid plants? (2)
- ii) What are the two methods used in haploid plant formation. (4)
- iii) Provide four reasons why haploid plants are important in plant breeding. (4)
- b) Briefly discuss the general properties of plasmids. (3)

**SECTION B: ANSWER ANY TWO QUESTIONS IN THIS SECTION**

4. Discuss the contents of the Zimbabwe Plant Breeders Rights Act [Chapter 18:16]. (20)
5. Discuss the stages involved in micropropagation and explain its importance in agriculture. (20)
6. Outline the bulk population breeding procedure and give the advantages and limitations of this breeding method. (20)

**END OF EXAMINATION PAPER**