



GWANDA STATE UNIVERSITY
FACULTY OF NATURAL RESOURCES MANAGEMENT & AGRICULTURE
DEPARTMENT OF HORTICULTURE & CROP PRODUCTION
BACHELOR OF SCIENCE (HONOURS) DEGREE IN CROP SCIENCE
CROP ECOLOGY AND PHYSIOLOGY
LCS 2105

First Semester Final Examination Paper

November 2023

This examination paper consists of 3 printed pages

Time Allowed: Three (3) Hours
Total Marks: 100
Special Requirements: None
Examiner's Name: R. Mapuranga

INSTRUCTIONS

1. Answer any **three (3)** questions from Section A and any **two (2)** questions from Section B.
2. Start each question on a new page

MARK ALLOCATION

QUESTION	MARKS
EACH QUESTION	20
TOTAL ATTAINABLE MARKS	100

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SECTION A: ANSWER ANY THREE (3) QUESTIONS [60 MARKS]

1. (a) Differentiate between crop ecology and crop physiology [4]
- (b) Qualify this statement: “Some organs may function as a sink during one stage of plant development, and as a source during another stage of development”. Give examples [2]
- (c) Explain how source strength and sink strength can be a yield limiting factors [8]
- (d) Draw a graph to illustrate variation of photosynthetically active radiation (PAR) in one year in the Southern hemisphere [6]
2. (a) Define the following terms:
 - i. Absorption/extinction coefficient [2]
 - ii. Crop ideotype [2]
- (b) Express the Beer – Lambert law in mathematical terms. Define each symbol [6]
- (c) Assuming that you are the Chairperson of Zimbabwe Plant Breeders Association (ZPBA), and you have been requested to deliver a public lecture on crop ideotypes to a group of Crop Science students. Recommend the characteristics of an ideal wheat ideotype that can be grown under Zimbabwean conditions [10]
3. (a) Explain how leaf angle affect the distribution of solar radiation within a plant community [6]
- (b) Discuss the factors that affect radiation receipts on the earth’s surface [14]
4. (a) Distinguish “closed systems” from “open systems” that use the IRGA to measure photosynthesis [4]
- (b) Describe how you would use an “closed system” to quantify the rate of CO₂assimilation by a plant leaf [10]
- (c) List the advantages of plant growth analysis [6]

SECTION B: ANSWER ANY TWO (2) QUESTIONS [40 MARKS]

5. (a) Define the following terms with respect to how plants have evolved to survive under stress
 - i. Avoidance [2]
 - ii. Adaptation [2]
 - iii. Tolerance [2]

- (b) Outline the mechanisms of flood injury in plants [14]
6. (a) List the morphological and physiological mechanisms of drought tolerance in crops [6]
- (b) Explain how maize yield and quality can be improved under drought and heat stress conditions [14]
7. (a) Describe the mechanisms of heat damage in plants [10]
- (b) Outline how plants' resistance to low temperature stress can be improved [10]

End of Examination Paper
