FACULTY OF NATURAL RESOURCES MANAGEMENT & AGRICULTURE

DEPARTMENT OF HORTICULTURE & CROP PRODUCTION

BACHELOR OF SCIENCE HONOURS DEGREE IN HORTICULTURE & CROP PRODUCTION

Plant Biology
NHC 1203
First Semester Final Examination Paper
April 2025

This examination paper consists of 3 pages.

Time Allowed: Three (3) Hours

Total Marks: 100

Special Requirements: None

Examiner's Name: L. Tembo

INSTRUCTIONS

1. This paper contains two (2) Sections (A and B) and seven (7) Questions
2. Answer all questions from Section A and three questions from Section B.
3. Start each question on a new page

MARK ALLOCATION

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

Section A: Answer all questions [40 Marks]

Question 1 (20 marks)

a) Define the following terms:
   i. Plant cell [1]
   ii. Chloroplast [1]

b) Explain the importance of plant water relations in maintaining cell turgor and enabling nutrient transport. [4]

c) Describe how the chloroplasts and mitochondria coordinate to support photosynthesis and overall cellular metabolism. [4]

d) Discuss the following theories/concepts as they are applied in plant-water relations,
   i. Bulk flow [5]
   ii. Cohesion-tension theory [5]

Question 2

a) Discuss the ecological significance of photosynthesis, outlining the roles of the light reactions and the Calvin cycle. [6]

b) Compare and contrast C_3, C_4, and CAM photosynthesis, emphasizing how each pathway adapts to environmental conditions. [8]

c) Describe the process of double fertilization in flowering plants and explain its importance in ensuring genetic diversity. [6]

Section B: Answer any three questions [60 Marks]

Question 3:

a) Define meristems and discuss their role in plant growth and organ formation. [8]

b) Explain the acid growth theory and its relevance to cell elongation and the establishment of apical dominance. [12]

Question 4

a) Define germination and outline the key stages involved in the process, including seed hydration and metabolic activation. . [8]

b) Discuss the mechanisms of seed dormancy (innate, induced, and enforced) and explain how dormancy benefits plants under varying environmental conditions. [12]

Question 5

a) Outline the synthesis and transport of auxins and gibberellins, and describe their physiological effects on plant growth and development. [10]

b) Discuss the application of artificial plant growth regulators in agriculture, including potential benefits and environmental concerns. [10]

Question 6

a) Define photoperiodism and vernalization, and explain their roles in regulating seasonal flowering in plants. [8]

b) Describe how plants respond to environmental stress (such as., drought, and temperature extremes) at the physiological and biochemical levels. [12]

Question 7

a) Assess how recent technological advancements (such as advanced imaging and molecular techniques) have enhanced our understanding of plant cellular processes. [8]

b) Discuss how integrating traditional plant biology with modern genetic engineering can lead to innovative agricultural practices. [6]

c) Propose two potential areas of future research in plant biology that could address current agricultural challenges. [6]

End of Examination Paper