GWANDA STATE UNIVERSITY

FACULTY OF NATURAL RESOURCES MANAGEMENT AND AGRICULTURE

DEPARTMENT OF HORTICULTURE AND CROP PRODUCTION

BACHELOR OF SCIENCE HONOURS DEGREE IN HORTICULTURE AND CROP PRODUCTION

NHC 2101 CROP ECOLOGY AND PHYSIOLOGY

FIRST SEMESTER EXAMINATION

DECEMBER 2024

NHC 2101 Crop ecology and Physiology

Time Allowed: 3 hours

Total Marks: 100

Special Requirements: None

Examiner's Name: Dr. P. Zanamwe

INSTRUCTIONS

1. Answer **all** questions in Section A
2. Answer **TWO (2)** questions in Section B
3. Start each question on a new page

MARK ALLOCATION

QUASTION	MARKS
SECTION A	60
SECTIONB	40
TOTAL ATTAINABLE MARKS	100

SECTION A: ANSWER ALL QUESTIONS IN SECTION A

QUESTION ONE

a. Define the following terms
   i. Growth (2 Marks)
   ii. Development (2 Marks)
   iii. Determinate growth (2 Marks)
   iv. Indeterminate growth (2 Marks)

b. Discuss the importance of leaf area index (LAI) in determining crop growth and yield (5 Marks)

c. Explain the concept of harvest index (HI) and its importance in crop breeding to increase crop yield (5 Marks)

QUESTION TWO

a. State three (3) products of the light reaction of the photosynthetic process (3 Marks
b. Distinguish between the C_3 and C_4 cycle and explain why C4 plants have higher carboxylation efficiency (CO_2 capture efficiency) than C3 plants (10 Marks)
c. Explain how C4 plants tolerate high temperatures in dry hot climates (5 Marks)
d. Explain the term photosynthetically active radiation (PAR) (2 Marks)

QUESTION THREE

a. State five (5) plant cell organelles that are absent in sieve element cells (5 Marks)
b. State any three (3) sources and four (4) sinks of photosynthetic products in a plant (7 Marks)
c. Explain how sink size and demand for assimilates determines the rate of photosynthesis in the source (leaves) (8 Marks)

SECTION B: ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION FOUR

a. Explain the importance of oxygen in the respiration process of plants. (10 Marks)
b. Discuss the importance of the fermentation respiration process under hypoxic conditions (4 Marks)
c. State and explain giving one (1) specific example of plants for each, two (2) modifications by which plants can survive waterlogging conditions (6 Marks)

QUESTION FIVE

Discuss the following water stress acclimation strategies

i. Decreased leaf area (5 Marks)
ii. Leaf abscission (5 Marks)
iii. Enhanced root growth (5 Marks)
iv. Stomatal closure (5 Marks)

QUESTION SIX

Describe the vegetative growth stages of a maize (*Zea mays* L.) crop and explain the impact of water stress on crop growth and final grain yield at each of the growth stages (20 Marks)

……………………………………THE END……………………………………………………………