JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY

SCHOOL OF BIOLOGICAL, PHYSICAL, MATHEMATICS AND ACTURIAL SCIENCES

UNIVERSITY EXAMINATIONS FOR THE AWARD OF A DEGREE OF MASTER OF SCIENCE IN PLANT ECOLOGY

1ST YEAR 1ND SEMESTER 2023/2024 ACADEMIC YEAR

MAIN CAMPUS - REGULAR

COURSE CODE:	**SBT 812**
COURSE TITLE:	**PLANT PRODUCTION ECOLOGY**
EXAM VENUE:	**STREAM: (MSC)**
DATE:	**EXAM SESSION:**
TIME: 2 HOURS	

Instructions:

1. **Answer ALL questions in Section A and Section B**
2. **Candidates are advised not to write on question paper**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room**

SECTION A: ANSWER ALL QUESTIONS (30 MARKS)

1. a) Briefly explain 4 main ways in which radiation is important for plant life (4 marks)

   b) $I = I_o e^{-kL}$ describes light flux through plant canopies: What does L represent in this equation? (1 mark)

   c) Explain the role of L in radiation transmission through plant canopies. (2 marks)

   e) Explain how forest trees enhance radiation penetration through their canopy layers (1 mark)

   f) Illustrate canopy assimilation response to increasing radiation (2 marks)

2. During photosynthesis, assimilates are transported in the phloem to the sink and immediately used or converted into osmotically inactive substances.

   a). List 3 assimilate sinks in plants (1.5 marks)

   b) Briefly explain why the transport of assimilates is a slow process (1 mark)

   c) List 3 homes that regulate the transport process (1.5 marks)

   d) Explain why assimilates have to be used immediately or stored in osmotically passive forms, away from the transport stream (1 mark).

   e) Using a diagram, distinguish between photosynthetic efficiency and photosynthetic capacity of a plant (2 marks)

   f) Infrared gas analysis is the key method employed to determine ecosystem CO_2 exchange. Describe the key components of the analyzer used in this analysis, stating why infrared rays are preferred. (3 marks)

3. a) Distinguish between C4 and C3 plants (4 marks)

   b) Explain why C4 plants lose their superiority over C3 plants in CO_2-fertilized environments (2 marks)

   c) Explain the current trend of increased invasion of the savanna by shrubby vegetation (2 marks)

   d) Assuming a transect from Mt. Kenya down to Lake Victoria, describe the distribution patterns of C3 and C4 grasses you are likely to encounter. (2 marks)

SECTION B: ANSWER ALL QUESTIONS (30 MARKS)

1. Discuss in detail, factors regulating carbon gain in plant canopies (10 marks)
2. Describe the standard methods employed to determine biomass in grassland ecosystems (10 marks)
3. a) Discuss the main resistances encountered by CO_2 along its flow path into the leaf mesophyll cells (5 marks)

   b) Discuss factors that influence stomatal regulation of CO_2 influx into the leaf mesophyll cells (5 marks)