



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY**

**SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES**

**UNIVERSITY EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE IN  
PLANT ECOLOGY**

**1<sup>ST</sup> YEAR FIRST SEMESTER 2016/2017 ACADEMIC YEAR**

**MAIN CAMPUS - REGULAR**

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**COURSE CODE: SBT 801**

**COURSE TITLE: EXPERIMENTAL TECHNIQUES AND  
METHODOLOGIES IN PLANT ECOLOGY**

**EXAM VENUE:**

**DATE: EXAM SESSION:**

**TIME: 3 HOURS**

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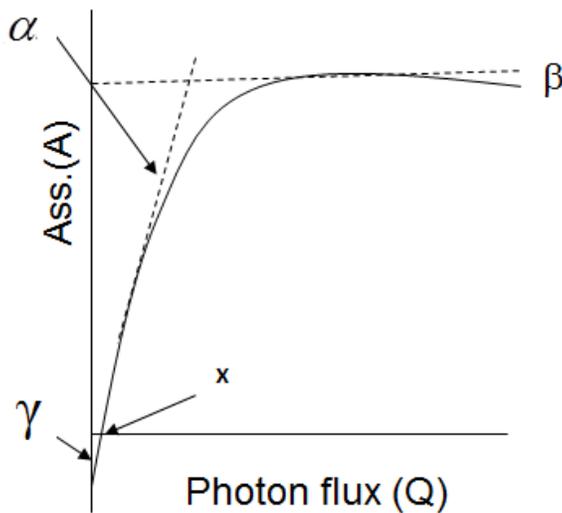
**Instructions:**

- 1. Answer ALL questions in Section A and Any two questions in 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**
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**SECTION A: SHORT ANSWER QUESTIONS (30 MARKS)**

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1. a) Distinguish between absolute and differential calibration (2 marks).  
 b) Explain the need for regular “Matching” of IRGAS during measurements (1 mark)
2. The figure below shows a light response curve. Briefly explain the respective components of the curve  $\alpha$ ,  $\beta$  and  $\gamma$  shown: (3 marks).



- a)  $\alpha$
  - b)  $\beta$
  - c)  $\gamma$
3. Distinguish between open and closed path gas analysis systems. (3 marks)
  4. A modified version of Fick's first law of diffusion
 
$$J_i = D_i(c_{i1} - c_{i2}) / l$$
 describes the movement of water across the stomata. Discuss. (3 marks).
  5. Briefly explain the use of a pressure chamber in measuring leaf water potential. (3 marks).
  6. Explain the principle behind the application of psychrometers in the measurement of tissue moisture contents. (3 marks).

7. Data loggers have become important research equipment. Discuss their merits and demerits. (3 marks)
8. Discuss the shortcomings of using gas chambers in CO<sub>2</sub> measurements in vegetation. (3 marks)
9. a) Briefly explain how you will estimate the leaf area index (LAI) of a meadow and state the importance of the results in ecosystem studies. (2 marks)
- b) Explain the advantages of LAI over LA in productivity studies (1 mark)
10. a) Small sensors are becoming popular in microclimate measuring. Briefly explain the merits and demerits of using such sensors. (1marks)
- b) Discuss factors that influence the location of a weather station (2 marks)

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**SECTION B: ESSAY QUESTIONS (30 MARKS)**

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11. a) Infra-Red Gas Analysis (IRGA) is a technique used to analyze concentrations of CO<sub>2</sub> and H<sub>2</sub>O in a volume of air. Explain the principle behind the success of the technique. (9 marks)
- b) Explain the need for regular “Matching” during measurements (6 marks)
12. A) Discuss the main measurement approaches used in the determination of soil moisture content. (9 marks)
- B) Discuss factors that determine the location of a weather station. (6 marks)
13. a) You are asked to estimate total transpiration of a forest stand. Select an appropriate technique, and explain the principle behind your preferred measurement technique. (10 marks).
- b) State the additional parameters which must be assessed in order to explain plant responses to its surrounding (5 marks)
14. Briefly discuss the application of Lysimeters in ecosystem research. (15 marks)