

## **WARNING**

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Family Name					
Given Name/s					
Student Number					
Teaching Period	Semester 2, 2018				

<b>ENV206 – Environmental Physiology</b>	<b>DURATION</b>	
	Reading Time:	<b>10 minutes</b>
	Writing Time:	<b>180 minutes</b>
<b>INSTRUCTIONS TO CANDIDATES</b>		
<p>The examination has TWO sections.</p> <p>Section A:                      Short Essay Questions            90 marks (15 marks per question, all questions of equal value)            Answer ALL (6) questions            Suggested Time: 90 mins</p> <p>Section B:                      Multiple Choice Questions            90 marks (3 marks per question, all questions of equal value)            Answer ALL (30) questions on the Multiple Choice answer sheet provided            Suggested Time: 90 mins</p> <p>Total marks for this examination: 180</p>		
<b>EXAM CONDITIONS</b>		
<p><b><u>You may begin writing from the commencement of the examination session.</u></b> The reading time indicated above is provided as a guide only.</p>		
This is a CLOSED BOOK examination		
No calculators are permitted		
No handwritten notes are permitted		
No dictionaries are permitted		
<b>ADDITIONAL AUTHORISED MATERIALS</b>	<b>EXAMINATION MATERIALS TO BE SUPPLIED</b>	
No additional printed material is permitted	1 x 20 Page Book 1 x 4-Multiple Choice Answer Sheet 1 x Scrap Paper	

**THIS EXAMINATION IS PRINTED  
DOUBLE-SIDED.**

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## Section A

### Short Response Questions

Answer all 6 questions.

**Total number of marks for this section: 90**

This section should be answered in the Answer Booklet provided.

Marks for each question are the same.

Suggested time allocation for Section A: 90 minutes.

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#### Question 1

On the following page there is a cross section diagram of a plant root, from the root tip to the point where lateral root formation occurs.

On diagram please label where:

- the apical meristem is located
- the tissue systems that arise from the primary meristem
- where cell division and where cell elongation occurs
- the root hairs are located
- nutrient uptake through interception is occurring
- the maximum nutrient uptake through mass flow is occurring
- the first phloem sieve cells are formed
- where mature vessel cells are formed

Briefly discuss the relative positions of the first occurrence of mature functioning phloem and xylem tissue and the implications for the functioning and growth of the plant root tip.

Which of the following cell types would not be able to divide to create new cells and why? Collenchyma, sieve cells, pith parenchyma cells, cortical parenchyma, fiber cells, vessel cells.

(Marks: 15)

Figure 1. Diagram of the tip of a root to assist in answering Question 1.

## Question 2

Light harvesting in photosynthesis is accomplished by Photosystems I and II, discrete structural units embedded in the thylakoid membrane of the chloroplast.

Briefly describe how the two photosystems work together to convert light energy to chemical energy. Use a diagram to illustrate your answer if you wish.

(Marks: 15)

## Question 3

Describe the light independent reactions of photosynthesis and then describe the biochemical and structural differences between C3 and C4 plants.

Why do C4 plants have an advantage under hot conditions with respect to (a) the functioning of Rubisco and (b) water use efficiency?

(Marks: 15)

## Question 4

Explain why the casparian strip and the endodermis are important for plant nutrient uptake.

Draw a diagram of the membrane of a plant and describe the structure.

Describe how nitrate could move passively through the membrane or be concentrated within the membrane.

(Marks: 15)

### Question 5

What are the lateral meristems that are present in the stem of a woody plant? Name the tissues produced by those lateral meristems.

What are the main cell types involved in the vertical movement of materials in the stem of a woody plant and what are their transport functions?

Briefly describe the role of water potential in plant tissues and the environment for xylem transport.

(Marks: 15)

### Question 6

Generally describe the adaptations for enhancing nutrient uptake in a mistletoe (*Amyema* sp.), a bladderwort (*Utricularia* sp.) and a legume (Fabaceae).

For the mistletoe, describe the water relations which are required for the adaptations to be successful.

For the legume, describe the specialist structures involved and critical role of leghaemoglobin.

(Marks: 15)