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UNIVERSITY OF NAMIBIA

FACULTY	AGRICULTURE, ENGINEERING AND NATURAL SCIENCES		
DEPARTMENT	ENVIRONMENTAL SCIENCE		
MODULE	PHYSIOLOGY		
MODULE CODE	MBL 3771		
DATE	JUNE 2022		
DURATION	3 Hours	MARKS	120

### **SUPPLEMENTARY/SPECIAL EXAMINATION**

Examiner: Prof. E. G. Kwembeya & Dr T. Sibanda (University of Namibia)

Moderator: Prof. K. C. Chinsembu (University of Namibia)

This EXAMINATION consists of THREE pages including this front page

#### ***Instructions***

- 1... Carefully read all the instructions.
- 2... There are two sections in this paper.
- 3... Remember to include illustrative drawings where possible
- 4... Answer all questions in Section A and choose any TWO questions in Section B

**UNIVERSITY OF NAMIBIA EXAMINATIONS**

## Section A

**This section is worth 60 marks. Answer all questions**

### QUESTION 1

Compare and contrast the compartmentation required for the chemiosmotic synthesis of ATP through photophosphorylation and oxidative phosphorylation. (4 marks)

### QUESTION 2

Briefly discuss the differences in plants with respect to CO<sub>2</sub> reduction in different photosynthetic pathways. (12 marks)

### QUESTION 3

(a) Explain why photorespiration is dependent on light and temperature. (4 marks)

(b) Explain why photorespiration does not occur in C<sub>4</sub> plants. (4 marks)

### QUESTION 4

(a) Distinguish between an essential element and a beneficial element. (2 marks)

(b) Distinguish between essential micronutrients and macronutrients. (2 marks)

(c) With respect to mineral elements, briefly explain what is meant by critical toxicity level. (2 marks)

### QUESTION 5

(a) Explain where in a cell does glycolysis occur and what role does it play in cellular respiration. (8 marks)

(b) Explain what happens when ATP is removed or is no longer produced in the muscle fibre. (3 marks)

### QUESTION 6

Describe the roles played by four named types of receptor proteins involved in cell signalling. (15 marks)

### QUESTION 7

The common leopard frog *Rana pipiens* can hop very fast in comparison to the western toad *Bufo boreas*, which is much slower. These two frog species have different jumping capabilities based in part on different levels of a key enzyme. Provide name of this enzyme and discuss the mechanisms involved. (4 marks)

## Section B: Essays Section

**This section is worth 60 marks; Answer any TWO questions in this section.**

1. Write an essay on energy transduction and the chemiosmotic synthesis of ATP. In your essay Fully explain the development and role of the proton circuit in energy-transducing membranes.  
(30 marks)
2. A rodent eats food of about six times its body weight to meet its energy needs, whereas a rhino eats only one-third of its body weight in one week to meet its energy needs. Discuss this finding.  
(30 marks)
3. Discuss the secondary active transport of glucose into an epithelial cell of the vertebrate small intestine. Supplement your answer with properly labelled diagrams.  
(30 marks)