

P530/2

Biology

(Theory)

Paper 2

July/Aug. 2019

2½ Hours



## UGANDA TEACHERS' EDUCATION CONSULT (UTEC)

### Uganda Advanced Certificate of Education

BIOLOGY  
(Theory)

Paper 2

2 ½ hours

#### INSTRUCTIONS TO CANDIDATES:

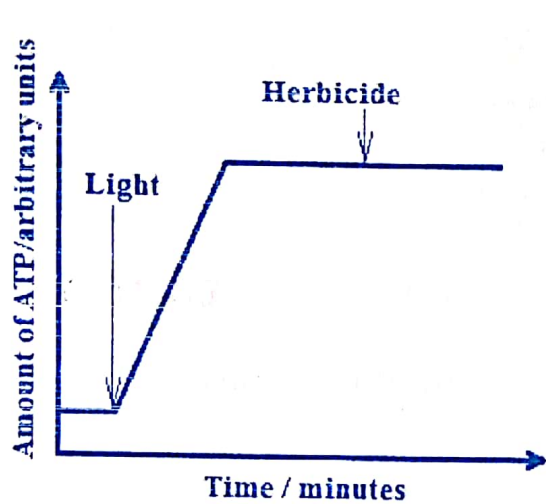
*This paper consists of six questions.*

*Answer question one in section A plus three others from section B.*

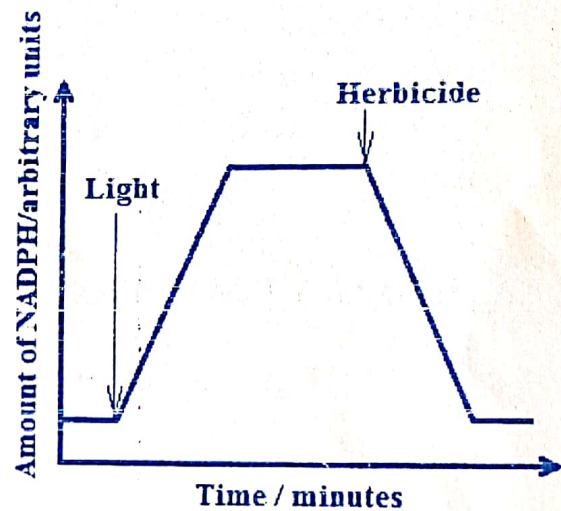
*Candidates are advised to read the questions carefully, organize their answers and present them precisely and logically, illustrating with well labelled diagrams where necessary.*

## SECTION A (40 MARKS)

1. The graphs in **fig. 1** and **2** show the amount of adenosine triphosphate (ATP) and reduced nicotinamide adenine diphosphate (NADPH) in isolated chloroplasts, which were placed in an isotonic and buffered medium, then exposed to light and later after, to an herbicide.



**Fig. 1**



**Fig. 2**

- (a) Describe the effect of
- (i) light on the amount of ATP and NADPH. (03 marks)
  - (ii) herbicide on the amount of ATP and NADPH. (02 marks)
- (b) Suggest the likely mechanism by which
- (i) light affects the level of ATP. (06 marks)
  - (ii) the herbicide affects the level of NADPH, basing on the evidence presented in the graphs. (04 marks)
- (c) Explain why isolated chloroplasts were placed in
- (i) isotonic medium. (02 marks)
  - (ii) buffered medium. (02 marks)

The cells of green alga, *Chlorella* when provided with radioactive carbon dioxide and other necessary conditions, can photosynthesize steadily.

Fig. 3 shows the levels of phosphoglyceric acid (3-PGA) and ribulose biphosphate (RuBP) manufactured by *Chlorella* when light is turned off and then on.

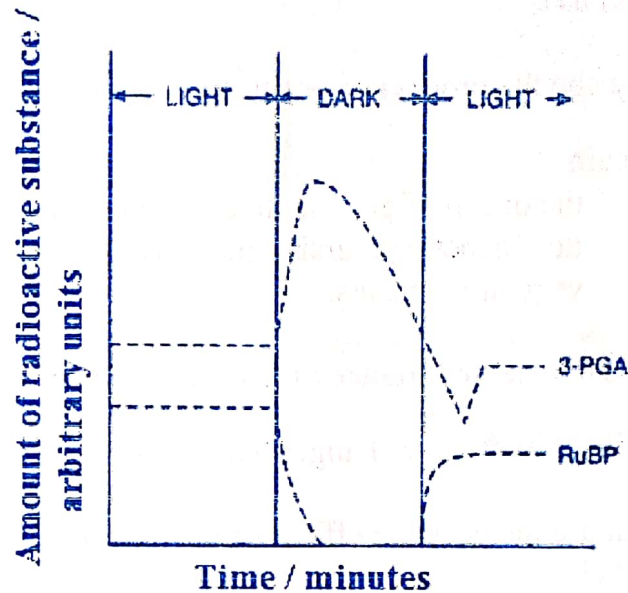


Fig. 3

- (d) Describe the changes in the levels of 3-PGA and RuBP
- in the absence of light. (04 marks)
  - on returning light again. (05 marks)
- (e) Suggest explanations for the changes in the levels of 3-PGA and RuBP
- in the absence of light. (05 marks)
  - in the presence of light. (05 marks)
- (f) Explain why the carbon dioxide used was radioactively labelled. (02 marks)



## SECTION B (60 MARKS)

2. (a) Describe the levels of protein structure. (12 marks)  
(b) Explain the **specificity** of enzymes, with reference to molecular structure. (08 marks)
3. (a) Describe the process of fertilization in humans. (08 marks)  
(b) Explain  
(i) the origin of genetic diversity in mammals. (08 marks)  
(ii) how genetic diversity may arise in plants propagated by vegetative means. (04 marks)
4. (a) Describe the importance of **turgidity** to plants. (05 marks)  
(b) Explain how turgor changes lead to the movement of guard cells. (08 marks)  
(c) What are the possible effects of stomatal behaviour on productivity in plants? (07 marks)
5. (a) Describe how the regions of the mammalian nephron and associated blood supply within the **kidney cortex** are adapted to their function. (09 marks)  
(b) Explain how the mammalian kidney produces urine that is hypertonic to blood. (07 marks)  
(c) How does the nephron regulate the pH of blood? (04 marks)
6. (a) (i) What is meant by **biological oxygen demand**? (02 marks)  
(ii) Outline the ways in which the quality of water in a natural water body can be monitored. (08 marks)  
(b) Explain the sequence of events that can lead to **eutrophication** of a water body. (10 marks)

END