
P530/2

Biology

Theory

June/July 2023

2½marks

UGANDA ADVANCED CERTIFICATE OF EDUCATION

BIOLOGY

(THEORY)

PAPER 2

2hours 30 minutes

Instructions to candidates:

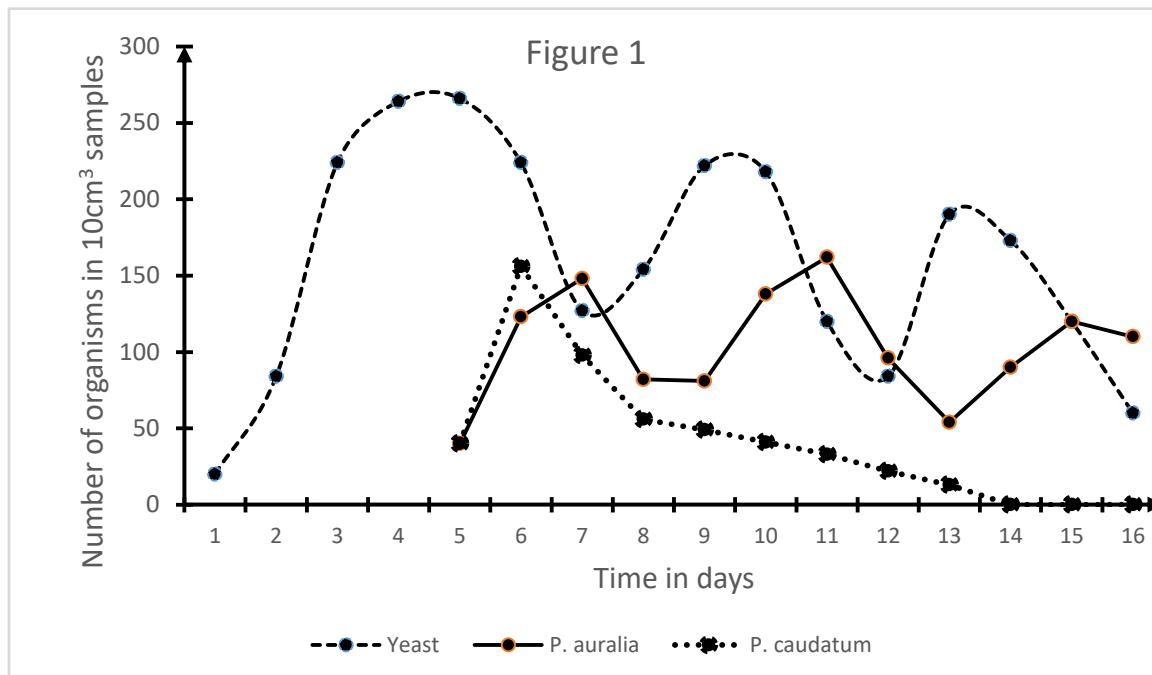
This paper consists of sections A and B.

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 wherever necessary.

SECTION A: 40 MARKS

1. A suspension of *Saccharomyces* (yeast) cells was added to a dilute sucrose solution at 25°C. The mixture was gently agitated for 16 days and 10 cm³ samples were withdrawn each day and the number of organisms counted. On the fifth day a small quantity of the culture containing two closely related *Paramecium* species (*P. auralia* and *P. caudatum*) was added. The results of the experiment are shown in figure 1 below.



- a. Describe the number of *P. auralia* in 10 cm³ samples during the first 9 days of the experiment. (10 marks)
- b. Compare the number of *P. auralia* and Yeast in 10 cm³ of samples during the last four days of the experiment. (05 marks)
- c. Explain the:
- Immediate effect of adding *Paramecium* species on number of yeast cells in 10 cm³ samples during the experiment as shown in Figure 1. (02 marks)
 - Changes in number of *P. auralia* in 10 cm³ samples during the first three days of their addition into the suspension. (08 marks)

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- iii. Changes in number of *P. caudatum* in 10 cm³ samples during the last five days of the experiment. (04 marks)
- d. Suggest what is being demonstrated by the interaction between *P. auralia* and *P. caudatum*. (03 marks)
- e. Explain the evolutionary effect of the phenomenon demonstrated between *P. auralia* and yeast, in animal species. (04 marks)
- f. As demonstrated by the results of the experiment over the 16 day period, the overall numbers of *P. auralia* and Yeast are regulated by a process.
- i. Identify the process. (01 marks)
- ii. Name three biological conditions that are regulated by the process identified in f (i) above. (03 marks)

Section B: 60 marks

Attempt any three questions from this section.

2. (a). Distinguish passive and active transport. (04 marks)
- (b). Describe the process of direct active transport of a single molecule through the plasma membrane. (08 marks)
- (c). Explain why most molecules do not freely diffuse across the cell surface membrane. (08 marks)
3. (a). Describe effects of regular exercise on support structures in humans. (06 marks)
- (b) Describe how support is achieved in:
- i. Mammals (07 marks)
- ii. Herbaceous plants. (07 marks)
4. (a). What is meant by the term facultative anaerobes? (02 marks)
- (b). Outline events leading to accumulation of lactic acid in mammalian muscles (04 marks)
- (c) Explain the benefits of formation of lactic acid in animals (14 marks)
5. (a). What is meant by tubular secretion? (04 marks)
- (b). How does the mammalian kidney prevent blood pH from becoming highly acidic? (12 marks)
- (c) In what ways is the structure of the Kidneys of different organisms in different habitats differ. (04 marks)

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6. (a). Explain the effect of interruption of the night period with a flash of light on flowering in:
- i. A short day plant (05 marks)
 - ii. A long day plant (05 marks)
- (b). Explain why a plant fails to flower when its leaves are removed. (03 marks)
- (c). Explain how movement of *indoleacetic* acid (I.A.A) ensures survival of the plant. (07 marks)

END