P530/2
BIOLOGY
(*Theory*)
Paper 2
2 ½ Hours
August 2022

TORORO ARCHDIOCESE EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

MOCK EXAMINATIONS 2022

BIOLOGY

(Theory)

Paper 2

2 Hours30 Minutes

INSTRUCTIONS TO CANDIDATES

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

Candidates are advised to read the questions carefully, organize their answers and present them precisely and logically using well labeled diagrams wherever necessary.

SECTION A – 40 MARKS

Question 1 is compulsory.

1. Three species of the genus Lolium, **A, B, C** and a **hybrid** between two of them were tested for their flowering requirements. All the strains were grown under controlled conditions (23^0C day temperature; 17^0C night temperature; long photoperiods). Sample plants of each strain were then subjected to different periods of time at 4^0Cbefore being returned to the original conditions. The results of the experiment are shown in Figure 1 below. **Strain A** of Lolium did not flower at week O (zero) at 4^0C

The graph below represents rèsults of a study on flowering requirements for three species of genus lolium and a hybrid between two of them. The number of days which elapsed between the end of the cold treatment and the onset of flowering were recorded after sample plants of each strain were subjected to different periods of time at 4^0C

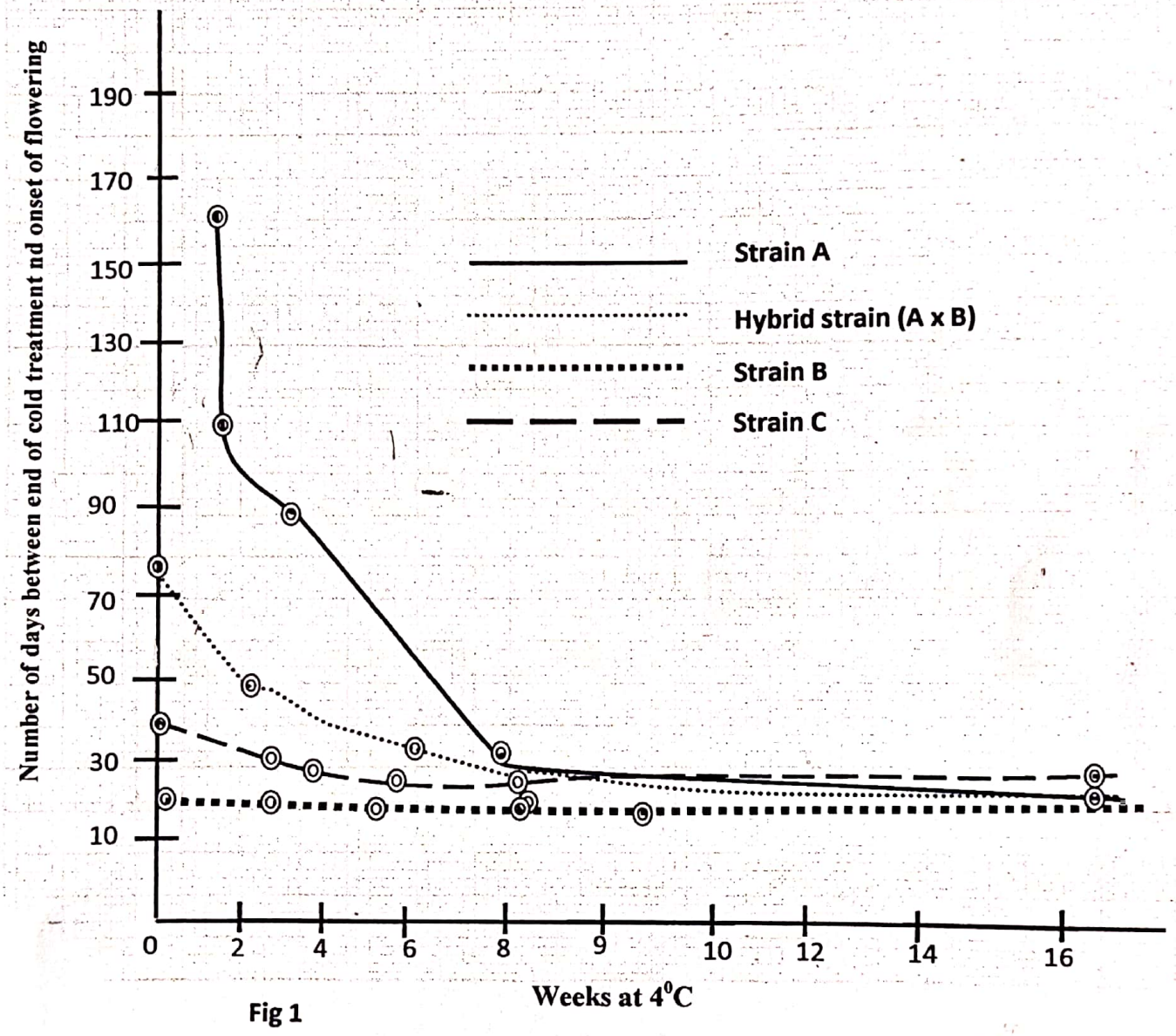

Fig 1

In another experiment, the effect of controlled periods of light and dark on the subsequent flowering behavior of cocklebur (xanthium strunarium) was studied. The results are shown in Table 1 below

Table 1.

Hours of alternating light and dark periods		Response
Light	**Dark**	-
8	16	Flowering
8	16 with light flash in middle of dark period	No flowering
16	16	Flowering
16	8	No flowering
16	8 with dark flash in middle of light period	No flowering
8	8	No flowering
12	12	No flowering

(a) Describe the effect of increasing periods of cold treatment on the onset of flowering in each strain of Lolium. (8 marks)

(b)(i) Name the biological process being investigated as shown by results in figure 1 (1 mark)

(ii) What is the significance of this biological process to the life cycle of Lolium? (5 marks)

(c)(i) In table 1, is cocklebur a short day plant, a long day plant, or a day-neutral plant? (1 mark)

(ii) With reference to the data in the table, explain whether flowering is triggered by the length of the day or the length of the night. (8 marks)

(d)(i) Explain in terms of **Pr** and **Pfr** how phytochrome controls flowering in short day plants and long day plants (7 marks)

(ii) Explain why a light flash in the middle of the dark period interrupts flowering, but a dark flash in the middle of the light has no effect. (4 marks)

(iii) Would the effect of the light flash in the middle of the dark period depend on the wavelength? (1 mark)

(iv) What would be the effect of a flash of red light and a flash of blue light? (1 mark)

(v) Sketch an action spectrum for the response (2 marks)

(e) How do relative lengths of light and dark affect a named type of animal behavior? (2 marks)

SECTION B (60 Marks)

2. Many of the metabolic reactions that occur in organisms produce hydrogen ions which could change the PH of body fluids.

(a) (i) Name two substances or groups of substances which act as buffers in mammals (2 marks)

(ii) Describe how the kidney helps to maintain the PH of the blood at a constant level (8 marks)

(b) Explain how glucose is reabsorbed in the nephron. (5 marks)

(c) Explain how a high blood pressure can be so dangerous to the functioning of the kidney nephron (5 marks)

3. (a) Describe the path taken by water through an angiosperm plant, from the soil to the atmosphere (8 marks)

(b) Explain the mechanisms involved in this movement in terms of water potential (8 marks)

(c) Why do some plants in water logged soils fail to absorb water? (4 marks)

4. (a) Describe the structure of
   (i) Xylem (6 marks)
   (ii) Compact bone (7 marks)

   (b) How is the structure of these tissues in (a) above is related to the functions they perform? (7 marks)

5. (a) Give an account of the production of gametes by the mammalian ovary. (8 marks)

   (b) What events occur in the egg immediately following the entry of the spermatozoon? (6 marks)

   (d) Explain how hormones interact to bring about ovulation (6 marks)

6. What are the ecological effects of the following:

   (i) Deforestation (12 marks)
   (ii) Discharge of raw sewage into a lake (8 marks)

END