

Name: ..... Centre/Index No: .....

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**BIOLOGY**

Paper 1

**Jul/Aug.2025**

2½ hours



**UGANDA TEACHERS' EDUCATION CONSULT (UTEC)**

**Uganda Certificate of Education**

**BIOLOGY**

**Paper 1**

2 hours 30 minutes

**INSTRUCTIONS TO CANDIDATES:**

*This paper consists of **seven** examination items. It has two sections; **A** and **B**.*

*Section **A** has **three** compulsory items.*

*Section **B** has two Parts; **I** and **II**. Answer **one** item from each part.*

*Answer **five** items in all.*

*Any additional item(s) answered will not be scored.*

## SECTION A

*Answer all the items in this section in the spaces provided*

### Item 1

In a recent biodiversity restoration programme, a team of ecology students from a university visited Mabira Forest to study how different plant species adapt to the forest floor. They focused on an area that had been recovering from past deforestation. The forest floor was shaded by a thick tree canopy, resulting in low light intensity, reduced air movement, and limited nitrogen content in the soil.

Despite these conditions, the students observed an abundance of leguminous plants growing among other vegetation. These legumes showed two key features: tendrils that coiled around nearby plants and swellings on their roots. In addition, many of the plants had leaves with visible water droplets on their surfaces during the day, even when it had not rained.

Wondering about how plants manage to survive and grow in such an environment, the students compiled a report and submitted it to the forest conservation office for expert review.

#### Task:

- a) Identify the plant structures whose functioning is likely to be affected by the forest floor conditions.

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**Item 2**

Mr. Muwaya, a 63-year-old man from a rural village, has for years maintained a habit of excessive alcohol intake and frequent smoking. Over time, neighbours observed changes in his behaviour, including irritability, poor memory, strained relationships with family and regular conflicts with local leaders. He also developed unexplained weight loss, increased thirst, frequent urination, and blurry vision, which gradually made it difficult for him to carry out daily tasks.

Following persistent pressure from his relatives, Mr. Muwaya visited the nearby health centre for a full medical check-up. Health workers informed him that he had developed a metabolic disorder affecting the regulation of blood sugar, and that the condition had started interfering with the function of certain organs, especially his eyes and kidneys. The health team explained that his condition was likely linked to long-term exposure to harmful substances and poor dietary practices.

In response, the village health committee organized a public health campaign to raise awareness about non-communicable diseases among adults, using Mr. Muwaya's experience as a case study.

**Task:**

- a) What health challenges is Mr. Muwaya likely to face as a result of his lifestyle?

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b) Explain to Mr. Muwaya the likely causes and effect of his condition.

- c) Explain how local officials and health educators can guide the community in preventing such health conditions?

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**Item 3**

Norman, a Senior Four student, took part in a school science project investigating how plants inherit characteristics. For his experiment, he selected two flowering plants of the same species — one with deep red flowers and another with white flowers. With the help of his teacher, he carefully transferred pollen from the red-flowered plant to the stigma of the white-flowered one.

After successful pollination, fruits developed on the white-flowered plant. These fruits had wing-like structures that made it easier for the seeds to disperse over short distances by wind. Norman collected several of the seeds and planted them in two different plots; one with well-prepared moist soil, and the other with dry, compacted soil. He later observed that only a portion of the seeds germinated.

As the plants matured, Norman was surprised to find that many of the new plants produced large flowers that were neither red nor white, but pink. This unexpected flower colour led him to seek guidance from his biology teacher, who introduced him to the concept of variation in inherited traits.

**Task:**

- a) Suggest biological reasons why some of the seeds in Norman's experiment failed to germinate.

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- b) Using a suitable genetic diagram, illustrate how the pink flower colour may have resulted from the cross-pollination Norman performed.

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- c) Explain how the plant species used in the experiment is able to pass on its characteristics to future generations.

## SECTION B

### Part I

*Answer only one item from this part. Answers should be written in the answer booklet(s) provided.*

#### Item 4

Mr. Omong, a commercial farmer in a rural district, expanded his agricultural land by clearing a forested area bordering a swamp. After cutting down the trees, he burnt the remaining vegetation and established a kraal unit on the cleared land. Over time, wastewater and animal waste from the kraal began to seep into the nearby swamp, especially during the rainy season.

Several months later, local community members began to notice unusual changes in the environment. Soil in the surrounding gardens became loose and prone to erosion. Heavy rains increasingly led to flooding in nearby valleys, and some bird species that once fed in the area were no longer seen. However, there were repeated outbreaks of waterborne diseases such as cholera, which began affecting villages downstream.

When approached, Mr. Omong denied any connection between his farming activities and the environmental changes. In response, the local environmental committee decided to involve biology students in preparing a report to help educate landowners on sustainable resource use.

**Task:**

- a) Explain to Mr. Omong how his actions may have contributed to the environmental problems reported in the community.
- b) Explain the importance of conserving natural resources found within the area where Mr. Omong lives.

**Item 5**

John an athlete teenager boy began his training a long a newly cleared path that cuts through a forest bordering a wetland.

While training, John also noticed heaps of soil deposited along the wetland edge and oily patches on the surface water. The area which was once quiet and covered with trees became noisy and dusty. This was after construction of machines which were used to open up the path way for easier access during the rainy season. Weeks later, community members began reporting changes in water clarity, decline in visible aquatic life and increased flooding around their homestead.

**Task**

- (a) Explain the likely challenges that will occur in the area and how they can be overcome.
- (b) Explain to the community members why they should conserve the eco-system.

**Part II**

*Answer only one item from this part. Answers should be written in the answer booklet(s) provided.*

**Item 6**

Mr. Higenyi is a retired old gentleman staying along the dusty murrum road in the village next to a milling factory. He was recovering from chest – related illness that made his breathing difficult and reduced appetite for cassava his daily meal.

Despite this, he was determined to participate in the 300 meter momo-marathon race organized by the MTN company to promote his quick recovery and fitness.

During his training, he puts on a mask but experiences difficulty in breathing, raised body temperature rapid heartbeat, muscle fatigue and cramps.

This has caused him a lot of distress and loss of weight.

**Task**

- (a) Explain to Mr. Higenyi the likely causes of the challenges he experienced during his work outs and in his life style.
- (b) Explain to Mr. Higenyi the appropriate measures he can undertake to improve his condition.

**Item 7**

Mr. Okello is an employee in Jumo Company Limited. He regularly smokes tobacco and feeds on a carbohydrate rich diet. Due to this life style, he started experiencing difficulty in breathing and his body mass index (BMI) is above normal average. Recently, Mr. Okello was terminated from work. As a result, he became stressed, lost appetite for food, frequently suffers from infection and has developed high blood pressure.

**Task**

- (a) Explain the cause of Mr. Okello's challenges;
  - (i) When he was still a worker in the company
  - (ii) After termination from work
- (b) Apart from seeking medical attention, suggest other ways in which Mr. Okello would solve his challenges.

**END**