



University of Ruhuna- Faculty of Technology

Bachelor of Biosystems Technology

Level I (Semester I) Examination, November/December 2025

Academic year 2024/2025

Course Unit: BST1133 Biology I (Written)

Duration: 2 hours

Directions to Candidates

- Answer **ONLY FOUR (04)** questions.
- Use a given booklet for answering the questions.
- Begin each answer on a new page
- If additional questions are answered, final question will be removed without marking

1. Mendel's laws are the basis of heredity.

a) Define the following terms in one or two sentences.

(20 marks)

- Codominance
- Model organisms

b) Briefly explain why Mendel's Law of Segregation applies to gamete formation

(30 marks)

c) Answer the questions using the observations of this experiment. **(50 marks)**

In a species of fruit fly (*Drosophila melanogaster*), two traits are considered:

Eye color: R = red (dominant), r = white (recessive)

Wing shape: L = long (dominant), l = short (recessive)

A cross between two unknown flies (parents) produced the following offspring phenotypic ratio: 9 (red eyes, long wings) : 3 (red eyes, short wings) : 3 (white eyes, long wings) : 1 (white eyes, short wings)

- I. Identify the genotypes of the parents and justify your answer briefly.
- II. Draw a Punnett square for the cross between parents you identified.

2. Cell organelles and cell division are vital for the survival of living organisms.

a) Define the following terms in one or two sentences. **(20 marks)**

- I. Interphase
- II. Apoptosis

b) List **two** key differences between prokaryotic and eukaryotic cells. **(20 marks)**

c) Give **one** main function of each of the following cell organelles. **(20 marks)**

- I. Nucleus
- II. Endoplasmic Reticulum (ER)

d) Draw and label four main stages of mitosis in an animal cell. Simple sketches are sufficient. Your diagrams should clearly show: **(40 marks)**

- The arrangement of chromosomes.
- Other relevant cellular structures involved mitotic division.

3. Genetic mutations can be harmful, but they can also offer advantages to organisms.

a) Define the following terms in one or two sentences. **(20 marks)**

I. Mutation

II. Aneuploidy

b) Briefly describe the difference between autosomal disorders and sex-linked disorders giving one example of each. **(30 marks)**

c) Briefly discuss the biological importance of mutations, using appropriate examples to support your answer. **(50 marks)**

4.

a) Briefly explain the relationship between cellular respiration and photosynthesis. **(20 marks)**

b) Write about the importance of light reaction and dark reaction for photosynthesis. **(40 marks)**

c) Draw and label the Calvin cycle, showing the steps required to produce three molecules of glucose. **(40 marks)**

5.

a) Explain the processes that occur in cellular respiration in human cells under aerobic (oxygen present) and anaerobic (oxygen absent) conditions. **(20 marks)**

b) Describe the stages of a signal transduction pathway (reception, transduction, and response) using one specific signaling molecule as an example. **(40 marks)**

c) Compare four types of cell signaling highlighting the distance of signal travel and typical examples for each. **(40 marks)**