

**BINDURA UNIVERSITY OF SCIENCE EDUCATION**  
**DEPARTMENT OF BIOLOGICAL SCIENCES**  
**HScBioTec**  
**BIOCHEMISTRY**  
**BTEC112 (2)**

**EXAMINATION**  
**2 HOURS (100 MARKS)**

MAR 2023

**INSTRUCTIONS**

Answer **FOUR** questions. You **MUST** answer **QUESTION 1** (Section A) and any **THREE** questions from Section B. Each question carries **25 MARKS**. Where a question contains subdivisions, the mark value of each subdivision is given in brackets. Illustrate your answers where appropriate with large, clearly labelled diagrams. You should not spend more than thirty minutes on each question.

**SECTION A (COMPULSORY)**

1. Two test tubes are inoculated with the same amount of identical growth medium and the same number of identical yeast cells. Test tube A is grown in the presence of oxygen and test tube B is grown in the absence of oxygen. After 12 hours, all the glucose in each culture has been consumed and you determine the number of total cells found in each culture.
  - (a) State which culture would have the greater cell density and explain (5 marks).
  - (b) Explain the expected variance of ATP concentration generated in both cultures following glucose metabolism. (15 marks).
  - (c) Describe the fate of pyruvate carbon in each of the two cultures. (5 marks).

**SECTION B**

2. Discuss **FIVE** unique properties of water and their significance to life on earth.
3. Describe how and when fats are used as a source of energy in mammalian systems.
4. Write short notes on any **FIVE** of the following
  - (a) Base pairing in DNA (5 marks)
  - (b) Oxidative phosphorylation (5 marks)
  - (c) Disulphide bridges (5 marks)
  - (d) Induced fit model of enzyme action (5 marks)
  - (e) Hexokinase (5 marks)
  - (f) Collagen (5 marks)

- 5.a) Describe the formation of a peptide bond. (5 marks)
- b) Justify the statement "Primary structure of a protein guides the formation of secondary and tertiary structure." Give suitable examples. (20 marks)
- 6.a) Discuss any **two** factors that influence enzyme activity (10 marks)
- b) Explain the different types of enzyme inhibition, with suitable examples. (15 marks)

END OF EXAMINATION QUESTION PAPER