BINDURA UNIVERSITY OF SCIENCE EDUCATION

BIOLOGICAL SCIENCES DEPARTMENT

BScBZH/ HBSc/ BScEd

BIOCHEMISTRY (BZH 108) AUG 2024

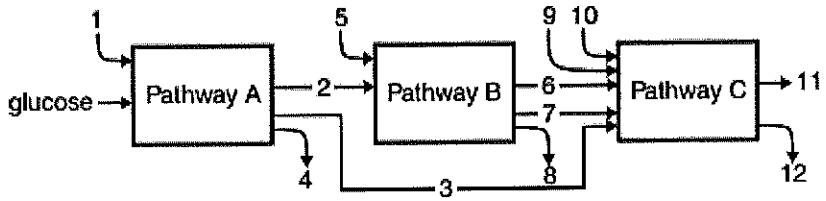
EXAMINATION 2 HOURS (100 MARKS)

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 sub division 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

1. The three boxes represent the three major biosynthetic pathways in aerobic respiration. Arrows represent net reactants or products.



a) Identify the following arrows:

i. Arrow 2 (1)
ii. Arrows 4, 8 and 12 could be (1)
iii. Arrows 3 and 7 could be (1)
iv. Arrow 9 (1)
v. Pathway B (1)

b) Describe the biochemical pathways of the light and dark reactions in C3 photosynthesis. (20)

SECTION B

2. The physical nature of a protein often reflects and affects its function.

a) Describe three types of chemical bonds/interactions found in proteins. For each type, describe its role in determining protein structure. (13)

b) Discuss how the structure of a protein affects the functions of the following:

i) Muscle contraction (4)

ii) Regulation of enzyme activity (4)

iii) Cell signaling (4)

3. **(a)** Explain how factors such as temperature and pH influence biological oxidation processes do. (13)

(b) Discuss the difference between the light independent reactions and light independent reactions of photosynthesis. (12)

4. Identify and explain the key steps in the synthesis of hemoglobin from porphyrins, including any important enzymes involved in the process. (25)

5. a). Water is important for all living organisms. The functions of water are directly related to its physical properties. Describe how the following properties of water contribute to:

i. transpiration (4)

ii. thermoregulation of endotherms (4)

iii. plasma membrane structure (4)

b) Identify two examples of xenobiotics and explain their potential effects on the environment. (13)

6 a) Explain the difference between DNA and RNA in terms of their structure and function. (12)

b) Describe the primary functions of the cell membrane in relation to transport mechanisms. (13)

7. a) Explain how amino acids contribute to the structure and function of proteins. Provide specific examples. (13)

b) Identify any two types of lipids and explain their roles. (12)

END OF EXAMINATION PAPER