



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**FACULTY OF APPLIED SCIENCE**  
**DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY**  
**BACHELOR OF SCIENCE HONOURS DEGREE IN BIOTECHNOLOGY**  
**CHEMISTRY OF BIOMOLECULES (SBT 1208)**

**Main Examination Paper**

**SEPTEMBER 2024**

This examination paper consists of 2 pages

Time Allowed : 3 hours

Total Marks : 100

Special Requirements : NONE

Examiner's Name :

**INSTRUCTIONS**

1. Answer **Four (4)** questions. Each question carries 25 marks.
2. Where a question contains subdivisions, the mark value for each subdivision is given in brackets.
3. Illustrate your answer where appropriate with large, clearly labelled diagrams.

**MARK ALLOCATION**

| QUESTION     | MARKS      |
|--------------|------------|
| 1.           | 25         |
| 2.           | 25         |
| 3.           | 25         |
| 4.           | 25         |
| 5.           | 25         |
| 6.           | 25         |
| <b>TOTAL</b> | <b>100</b> |

- 1.(a) Draw the tripeptide Ser-Tyr-Gln. (3 marks)
- (b) Calculate the hydrogen ion concentration of a solution if the hydroxyl ion concentration is  $5.0 \times 10^{-8}$  M and indicate whether the solution is acidic basic in nature. (5 marks)
- (c) Describe the different levels of protein structure using haemoglobin as an example. (17 marks)
- 2.(a) Write short notes on the following:
- (i) Maltose. (5 marks)
- (ii) Sucrose. (5 marks)
- (iii) Lactose. (5 marks)
- (b) Differentiates between B-DNA and Z-DNA. (10 marks)
- 3.(a) Briefly describe the following properties of water:
- (i) Cohesion. (3 marks)
- (ii) Capillary action. (3 marks)
- (iii) Adhesion. (3 marks)
- (iv) Specific heat capacity. (3 marks)
- (b) Distinguish between glycolipids and phospholipids. (13 marks)
- 4.(a) Compare and contrast DNA and RNA. (10 marks)
- (b) Classify amino acids based on the chemical properties of their side chains. (15 marks)
- 5.(a) Write short notes on starch and glycogen. (10 marks)
- (b) Discuss the classification of proteins according to their functions. (15 marks)
- 6.(a) Draw the fatty acid C<sub>22:4</sub> (cis, cis, trans, trans  $\Delta^{6,10,15,19}$ ) and circle the beta, gamma and omega carbon atoms on the structure. (6 marks)
- (b) Give an account of the bonds that maintain the three dimensional structure of a protein. (7 marks)
- (c) Compare and contrast the structures and functions of progesterone and estrone. (12 marks)

**END OF EXAMINATION**