



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**FACULTY OF APPLIED SCIENCE**  
**DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY**  
**BACHELOR OF SCIENCE HONOURS DEGREE IN APPLIED BIOLOGY AND**  
**BIOCHEMISTRY**  
**FOOD CHEMISTRY (SBB 2107)**

**Main Examination Paper**

**DECEMBER 2024**

This examination paper consists of 2 pages

Time Allowed : 3 hours  
Total Marks : 100  
Special Requirements : NONE  
Examiner's Name : MR D. NDEBELE

**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**

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

1. (a) Define caramelisation. (2 marks)
- (b) Describe the reactions involved in the caramelisation of sucrose, including the formation of new compounds and the development of flavour and colour. (8 marks)
- (c) Describe the structural composition of agars and carrageenans, and explain their functional properties as food additives. Provide specific examples of their applications in food products. (15 marks)
2. (a) Describe the process of retrogradation in bakery products, and explain how it can be minimised or reversed in bakery products. (10 marks)
- (b) Give an account of the three important reactions of chlorophyll that may take place during the cooking process of green leafy vegetables, indicating how these reactions influence the colour of the vegetables. (15 marks)
3. Discuss the effects of high-temperature processing, the action of lipases and metal contaminants in the development of "off" flavour and odour development in fatty foods. Your answer should include the mechanisms of reactions involved.
4. (a) Discuss the role of protein interaction in the production of the following foods:
- (i) Cheese. (8 marks)
- (ii) Dough used for bread making. (7 marks)
- (b) Describe the Maillard reactions and explain how these reactions may contribute to changes in the quality of food. (10 marks)
5. (a) Describe the role(s) of various antioxidants in food preservation. (10 marks)
- (b) Discuss the nature of the changes that take place in the production of black tea. (15 marks)
6. With the aid of diagrams and chemical reactions, explain the importance of phenolases in food chemistry and processing.

**END OF EXAMINATION**